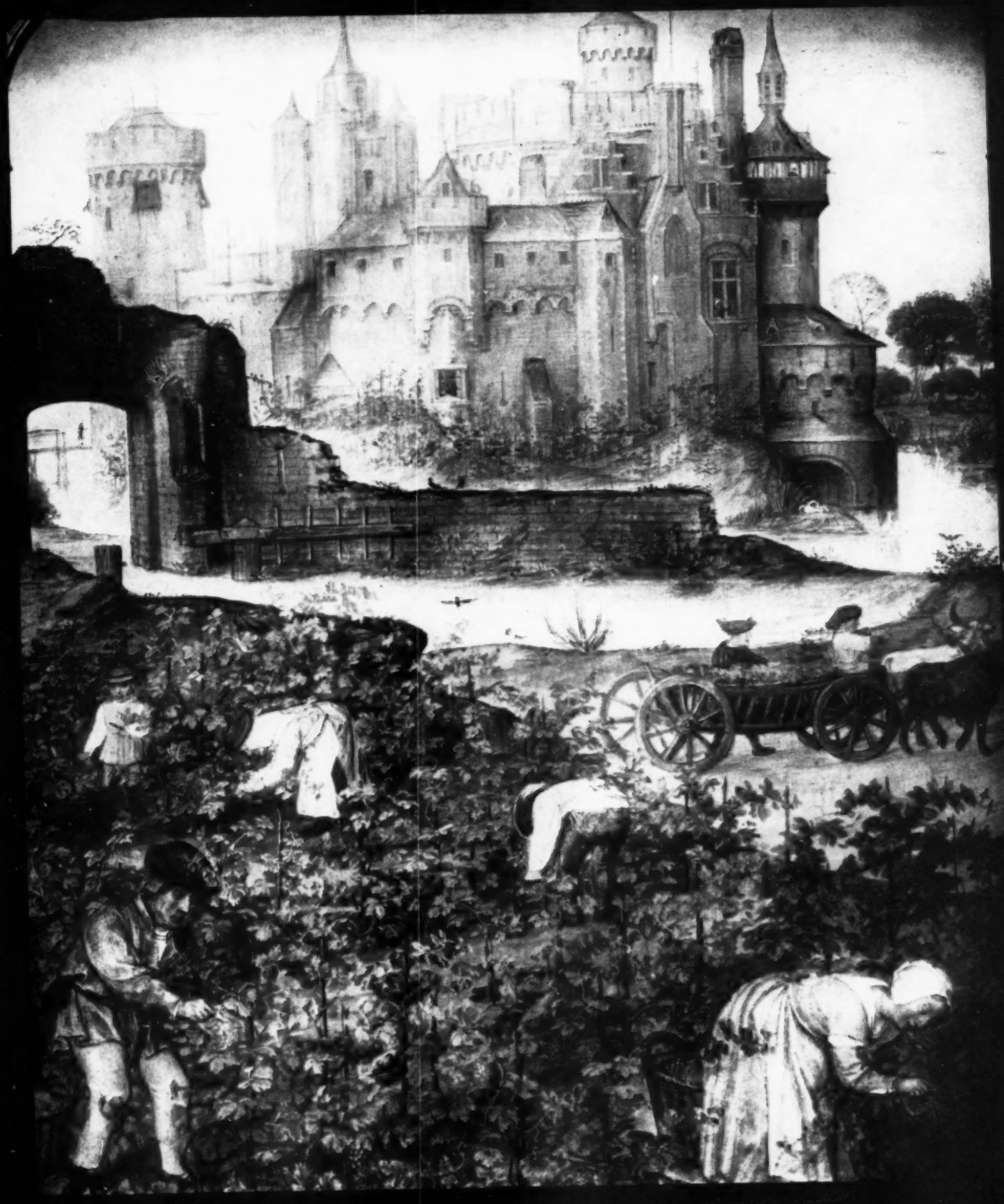
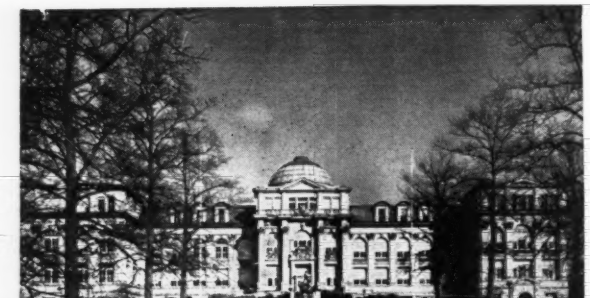


THE GARDEN JOURNAL

OF THE NEW YORK BOTANICAL GARDEN



Children's Annual Flower Arrangement Competition, in cooperation with the Office of Nature Study and School Gardens of the Board of Education of the City of New York, October 26, 1957.

Chrysanthemum Show in Conservatory of The New York Botanical Garden starts November 9 and continues three weeks or more.

Christmas House Show, December 4, 1957
Theater Benefit, January 8, 1958
Morning Lecture Series, January 9, 16, 23, 30, 1958
Annual Members' Day, February 6, 1958

THE GARDEN JOURNAL

of The New York Botanical Garden

DOROTHY EBEL HANSELL
Editor

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AMONG OUR CONTRIBUTORS

WINIFRED NOTMAN (MRS. DAVID C.) PRINCE engaged in extensive and very careful research when writing about John Bartram and "Thorndon Park." "It is not a fairy tale," stated Mrs. Prince, a member of The New York Botanical Garden living in Schenectady, New York, in submitting her contribution to The Garden Journal. "It can be documented. Many people in England were kind enough to admit me to their confidence." . . . . HELEN M. (MRS. MORTIMER J.) FOX is an ardent gardener, author of several books, contributor to a number of horticultural publications, active in several plant societies—among them the Herb Society of America, the North American Lily Society, the American Rock Garden Society—and has traveled widely abroad and in this country, always on the alert to gain first-hand information on plant material . . . . ROY DAVIDSON, raised on a wheat ranch in eastern Washington and living there at the present time, has been landscape designer and florist. Growing iris ever since he was a boy of twelve, he now grows some of all the many groups. He has been breeding iris for ten years and introduced his first 'Original' this year, collects American native iris and operates a test garden for them, is vice-president of Region 13 of the American Iris Society and member of the British and New Zealand iris societies, and has written several papers principally on dwarfs and species. In other words, Mr. Davidson is a serious student of the genus *Iris* . . . . BRYAN TAYLOR is another keen horticulturist from the Northwest, proprietor of Taylor Nurseries of Seattle, Washington, which engages in landscape design, construction, and planting . . . . MARJORIE (MRS. KARL) WIHTOL grows a variety of plants in her home and garden at Middletown, N. J. That she loves them and understands their traits is evident in her letter to "Dear Fred" .... SPENCER HARRISON CAPREAL has made intensive and extensive study of the cultural practices and requirements of outdoor chrysanthemums. The fine blooms on the plants in his garden bear witness to the fact that he knows his subject. The information on "below soil surface" and "above soil surface," which he presents in his article in this issue of The Garden Journal, is useful to all gardeners whether they specialize as Mr. Capreal does in chrysanthemums, or in roses, iris, peonies . . . . . T. H. EVERETT is Curator of Education and Horticulturist of The New York Botanical Garden, lecturer and author . . . . MARY F. (MRS. SPENCER H.) CAPREAL also grows and exhibits chrysanthemums . . . . GERTRUDE B. FOSTER is Editor of Herb Grower Magazine.

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JOHN BARTRAM AND THORNDON PARK

By **Winifred Notman Prince**

"THE TREES OF THE east coast of North America are not useful to us here in Britain. We are planting the Douglas-fir which is better suited to our climate."

We were having cocktails on an August Sunday in an old mansion in Lincolnshire. Our host was a leader in contemporary reforestation of Britain.

My thoughts turned back more than two hundred years to eighteenth century Britain's reforestation. Massachusetts, Pennsylvania, and Virginia were sending pine cones, acorns, and berries to London, and a young disfranchised Catholic landowner was planting them in his nursery beds and dreaming of the woods that would some day cover the barren heaths of the enclosed commons of Essex.

Most of the seeds came from John Bartram of Philadelphia, an indefatigable collector whom Samuel Chew had found for his London correspondent, Peter Collinson. Collinson was a successful mercer of the City of London, who exported woolens and silks to the North American Colonies and to the Continent. He was also an enthusiastic horticulturist with a country villa in Camberwell Peckham on the Surrey side of the Thames, where he experimented with seeds that came to him from his business correspondents. These included, besides the Philadelphia merchants, Dr. Jan Fredrik Gronovius, a great merchant and amateur botanist of Haarlem, and Col. William Byrd and Col. Custis of Virginia. Col. Byrd lived at "Westover" on the James River; Col. Custis at "White House" on the Pamunkey.

Collinson's customers in England were the landed nobility, many of them Roman Catholic, and, in the eighteenth century, under disabilities similar to those under which the Friends labored. They and their ladies bought from him the materials for their clothing; and warm personal relations were often established, especially when he visited their country homes. A common interest in horticulture bridged the gap between landed aristocracy and trade.

Some of them met frequently at meetings of the Royal Society of London, held in Crane Court. Collinson was proposed for membership in November, 1728, by the Quaker Fellow, Dr. Silvanus Bevan, a wealthy apothecary, whose house in Hackney, filled with oil paintings, fine old china, and a large library, was frequented by the scientific men of the day. His election was recommended by Sir Hans Sloane, President of the Royal Society, and by Sir Hans's librarian, a young Swiss physician, an authority on small-pox, Dr. Johann Kaspar Scheuchzer. It was put through at the next meeting.

Three years later, at another meeting of that illustrious group, Dr. John Martyn, fellow of the College of Physicians of London, secretary of the Botanical Society, and authority on the flora of the Peak District of Derbyshire, introduced a tall, handsome youth and proposed his election to membership. Robert Edward, Baron Petre of Writtle, was eighteen years old, heir to great estates in Essex, Kent, Suffolk, Devon, Somerset, and Gloucestershire. His father had died of small-pox three months before he was born. His mother, seventeen years old when her husband died, had educated him for his responsibilities, with the help of three trustees, a chaplain, and a steward. They had encouraged his interest in the world of outdoors and in art and architecture. His cousin, the second Duke of Richmond, also a Fellow of the College of Physicians, had been chosen by the Royal Society as the man to whom the Transactions for 1732 were to be dedicated. Dr. Martyn's noble candidate was elected to membership forthwith.

Lord Petre and his mother Catherine, Lady Petre, lived thirty miles out of London in Essex, part of the time at "Ingatestone Hall" near Chelmsford, and part of the time at "Thorndon Hall" near Brentwood. The months following his election to the Royal Society were occupied with preparations for his marriage to Lady Ann Radcliffe to whom he had been betrothed when he was sixteen and she was fourteen.

Lady Ann was the daughter of the third Earl of Derwentwater, who had been executed, when she was an infant, for his support of James Stuart's attempt to take the throne in 1715. She and her mother were living at Odstock, near Salisbury, with her grandfather Sir John Webb.

It was planned that Lord Petre and his bride would live at "Ingatestone Hall," while Catherine, Lady Petre, now in her thirty-fifth year, would continue to reside at "Thorndon." There were improvements that Lord Petre wished to make at "Ingatestone," a Tudor mansion of soft red brick with gardens, surrounded by a wall and approached through an entrance arch and clock tower. Gardens were Lord Petre's delight, and he saw changes that could be made in those at "Ingatestone;" but "Thorndon" was his real interest, and he was already thinking ahead to its development.

During these winter months before his marriage, he was joined by another young man who was to be his constant companion for the next five years, and was to carry out much of the work of developing Lord Petre's plans for "Thorndon." John Tempest was a younger son of Sir Stephen Tempest of "Broughton Hall," Yorkshire. Like many sons of the great Catholic families of seventeenth and eighteenth century England, he had been sent across the Channel for his education, where he could be taught by Roman Catholics; and, as the "Broughton Hall" chaplain was a Jesuit, it was to be expected that he would go to the English Jesuit College at St. Omer which had been founded by Oxford dons in the reign of Henry the Eighth. Later he spent time at the Abbey of Watten and then was sent to Istanbul, where he professed on February 26, 1730.

His first assignment was to accompany Lady Mary Gerard, the aunt of Lady Ann Radcliffe, on her travels through the Holy Land. She died in Joppa in February, 1731, and he returned to Istanbul, and Salonica, and sailed for England. He had followed much the same itinerary as the director of the Jardin du Roi in Paris, Joseph Pitton Tournefort; and like him he brought home seeds of the plants that he observed. As important as the seeds were the memories of the gardens that he had seen in Italy and the Levant, as well as those with which he was familiar in France and Flanders.

On his arrival in England he was assigned to the Suffolk District, to which "Thorndon Hall" belonged, and Lord Petre appointed him chaplain to replace his childhood tutor, Father Robert Manning, who had just died at an advanced age.

The marriage of Robert Edward, Lord Petre, and Lady Ann took place on May 2, 1732, accompanied by the careful property arrangements considered necessary when the representatives of important and wealthy families were united. Lady Ann was the heir of the Derwentwater estates, because her only brother had died during the winter; as the Dowager Lady Petre had, long ago and also as a young girl, fallen heir to the Fromond and Walmsley estates in Surrey and Lancashire, by the deaths of her older brothers.

"Ingatestone Hall" became their residence, but not for long because Catherine, Lady Petre, still a young woman after twenty years of responsible widowhood, decided to remarry. Her proposed husband, Charles Stourton, a member of Gray's Inn, who had been educated at St. Gregory's College in Douai, was five years younger than she. They were married on April 2, 1733, and left "Thorndon Hall" to live on a Fromond estate in Cheam, Surrey.

The young Lord and Lady Petre were now free to occupy "Thorndon Hall" and to change it as they pleased. To be sure, Lord Petre was still not of age as determined by his father's will, but the trustees of his estate recognized his ability and judgment and approved his plans.

His first move was to retain Giacomo Leone, a Venetian architect and disciple of Andrea Palladio, to design changes in "Thorndon Hall." Leone had been in England some fifteen years, having been brought there by Richard Boyle, Earl of Burlington. Burlington had come to know the villas of the Venetia, when he had made the Grand Tour, and wanted to bring their comfort and elegance to England. To that end he planned to publish in English an edition of Palladio's work on architecture, and induced Leone, who was architect to the Elector Palatine in Bonn, to come to London to oversee the engraving of the plates. Leone spent the remainder of his life in England.

Leone had worked with Lord Burlington in rebuilding "Chiswick House," introducing features from Palladio's Villa Capra, in Vicenza, known as "La Rotunda," and from several other Venetian villas. He designed "Clandon Park" in Surrey for Lord Onslow, and several houses in Lancashire and Yorkshire. Benjamin Mildmay, the Earl of Fitzwalter, Lord Petre's neighbor in Chelmsford, had engaged Leone to design "Moulsham Hall," to replace his Tudor mansion of the general character of "Ingatestone" and "Thorndon Hall."

Leone's plan for "Thorndon Hall" took into account Lord Petre's enlarged and growing household and his interest in giving form to the surrounding landscape. The mansion of mellow red Tudor brick was a shallow structure with many chimneys, stretching along the ridge north of the Thames estuary. It paralleled the river and the two main highways from London to the east coast. The windows looked across a green meadow, over a wall, to the river where ships carried the trade of England with the markets of the world. The east wing looked out on the stables and the pasture for the horses, which were necessary for transportation as well as for farm work. Lord Petre saw the possibility of developing formal water gardens from the mill stream in the valley separating West Horndon from East Horndon. He proposed tearing down the stables and rebuilding the east wing to include a chapel and living quarters. Where the stables had been, he planned a formal garden with a terrace overlooking the ponds.

The work really got under way in the spring of 1733, when Lord Petre moved his household from "Ingatestone" to "Thorndon." He and Mr. Tempest arranged a studio where large sheets of parchment could be laid out, and he sketched two plans as a basis for the work. One plan was for gardens close to the Hall; the other was a plan of the entire Park. The formal garden had been on the west end of the house, but now it was to be on the east end with a view across the mill pond to the woods, leaving the west end free for greenhouses.

The plan for the Park called for a windbreak of trees on the height of land to the north of the house toward Ingrave, in the arid fields that had been pasture. An avenue lined with trees led from the house to the highway, an eighth of a mile to the south.

In October 1733 Lord Petre visited his cousin, Philip Howard, brother of Edward Howard, the ninth Duke of Norfolk, who lived at "Buckenham House" on the Yare River. They talked over the improvement of that property, and Lord Petre suggested the creation of a reflecting pool.

During the winter, Parliament united the parishes of West Horndon and Ingrave. Lord Petre agreed to build a new church in the center of the new parish. This enabled him to include the church mede belonging to the old church of St. Nicholas, which lay south of the manor house, in the plans for his estate. By combining the church mede and the West Horndon stable mede, stock field, pit field and pasture, he was able to project a formal landscape design leading downhill from the south terrace and giving an unbroken view of the Thames Valley. The new church was built during the following months under the supervision of his lordship.

Following Lord Petre's coming of age in June, 1734, he went north to Lancashire to see the properties of his mother's family in Ribbesdale. His cousin, Bishop Francis Petre, lived near Ribchester in the manor house of "Showley Hall" on a high bluff above the meandering Ribble River. But Lord Petre resided at "Dunkenhalgh," outside of Blackburn, in the gently rolling country of Lancashire. The mansion of "Dunkenhalgh" had been built by his grandfather, Bartholomew Walmsley, and the formal gardens and surrounding park were his mother's childhood playground.

The Thorndon chaplain, John Tempest, accompanied Lord Petre and visited his parents at "Broughton

Hall," near Skipton, twenty-five miles from "Dunkenhalgh." He called on Dr. Richard Richardson at nearby "Bierly Hall," Bradford, to discuss an exchange of plants with that ardent botanist, who had business connections with Dr. Gronovius of Haarlem. From this conversation developed a series of attempts to transplant the cloudberry from the peat-earth of Pendle Hill to the sandy soil of Essex.

At "Bierly Hall," Mr. Tempest inspected Dr. Richardson's greenhouses which were built against the south side of a high wall, a hundred yards from the Hall. They had been constructed by the workmen who had built John Blackburn's stoves at "Orford Hall," between Manchester and Liverpool. In the south of England, the design of greenhouses differed somewhat, because Dr. William Sherard had introduced the principles of design worked out by Dr. Hermann Boerhaave, a distinguished physician of Leyden. The great banker, Sir Josiah Child, had such a greenhouse at "Wanstead House."

Thorndon's greenhouses were on the south side of the west end, protected from the heavy winds and given the sun's warmth. They were heated by stoves, which gave the structures their eighteenth-century name. One of them was sixty by twenty feet with a roof high enough to take palm trees, acacias, and banana trees. For tropical and semi-tropical fruits had been introduced into England, many of them from Jamaica and Barbados by Sir Hans Sloane. Lord Petre had been interested in them before his marriage and had collected several varieties of succulents and other tropical and sub-tropical species. He offered to exchange some of these with Dr. Richardson, for northern plants like the cloudberry.

By the early months of 1735 plans were well advanced. The entrance drive, that led from the house past the stables to the Romford-Chelmsford highway, had been bordered with elm trees since the time of Sir John Petre who built the house, but some of them had died. Lord Petre decided to replace them. Huntback, his head gardener, showed his skill by superintending the selection of elms to match those that remained. Twenty-four of them, sixty feet high, were found in the park and demesne lands. They were dug, balled, and transported by oxcart to their new location. All of them lived.

During the summer preparations were made for reforesting the barren land that fringed the park. The soil was Bagshot sand that supported heather and bracken, a meager pasturage for sheep. If this could be encouraged to support a forest, it would be a profitable crop, for enough timber had been cut in England by the eighteenth century to give real concern to his Majesty's government. Lime could be obtained cheap from Kent chalk hills. It was brought across the Thames Estuary in hoys and fishing smacks, unloaded at Tilbury into oxcarts and from there drawn to the park, where it was spread on the laundes, as the untilled land was called.

Preparation of the nursery beds required greater care than merely spreading lime. Collinson had had experience in his own garden and had advised other gardeners about London and elsewhere in England on the best method of germinating seeds obtained from Massachusetts and Virginia. His directions were explicit.

Mrs. Prince did considerable research in the preparation of this contribution to The Garden Journal. In addition to the following list of references, Mrs. Prince had access to original manuscripts, letters, diaries, maps, wills, inscription on a tomb-stone, minutes of meetings of and philosophical transactions of the Royal Society of London, transactions of the Linnaean Society of London. — The Editor.

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The nursery bed should be sheltered from the north and west winds and open only to the south and southeast. A trench should be dug, three feet wide and two feet deep, and the hole filled with selected soil. "Virgin sandy soil" was, in Collinson's experience, the best for North American seed; but if that were unavailable, he recommended the top sod of an old pasture. The sod would have to be broken carefully to extract the grass roots; and then the soil should be screened and sifted, and a little sea sand mixed with it.

In the spring of 1736 Collinson brought to "Thorndon Park" seeds which he had received from Bartram the previous autumn, when the late ships arrived from Philadelphia. The family had moved into the west end of the Hall so that the alteration of the east end could be begun.

This first planting contained the seeds of several kinds of trees and shrubs as well as perennial and annual plants. Collinson had received acorns of the scarlet *(Quercus coccinea)* and live oak *(Quercus virginiana)*; nuts of the hackberry *(Celtis occidentalis)*, black walnut *(Juglans nigra)* and butternut; cones of the hemlock *(Tsuga canadensis)*, red-cedar, tulip-tree *(Liriodendron tulipifera)*, white-cedar *(Chamaecyparis thyoides)*, tamarack *(Larix laricina)*, balm-of-Gilead fir *(Abies balsamea)*.

Lord Petre wanted flowering shrubs, and Bartram had sent Collinson many of them. There were choke cherries *(Prunus pensylvanica)* and pin cherries, beach plums *(Prunus serotina)*, cockspur thorn *(Crataegus crus-galli)*, rose acacia *(Robinia hispida)*, laurel *(Kalmia latifolia)* moosewood *(Acer pensylvanicum)*, magnolia *(Magnolia virginiana)*, dogwood *(Cornus florida)*, red osier *(Cornus stolonifera)*, judas-tree *(Cercis canadensis)* and serviceberry *(Amelanchier canadensis)*.

All these shrubs were deciduous, and Lord Petre recognized the beauty that evergreens give to the winter landscape. He mentioned to Collinson the effects that Sir Josiah Child had created at "Wanstead House." Collinson remarked that a neighbor of his in Surrey had used larches with good results and suggested that Lord Petre accompany him to Wimbledon to see Sir Theodore Janssen's plantations. This was within

(Continued on page 152)

A VISIT to CALIFORNIA GARDENS and GARDENERS

By Helen M. Fox

Tasmanian black tree-fern. *Cyathea medullaris,* among sycamores in Jack Evans' garden, Los Angeles, California

THIS WAS NOT by any means my first trip to California, but it was by far the most rewarding. The people I met, most of them gardeners, were warm, friendly, and outgoing, and I saw many lovely gardens and hundreds of handsome plants both cultivated and wild, some of them known to me heretofore only by hearsay. In fact, I saw so many plants I sometimes felt as if I were barely able to keep my head up above the masses of color.

One of the advantages of gardening in California is the cool nights which prevent flowers from fading. Consequently, individual blooms last a long time instead of making only a fleeting ten-day appearance as happens with flowers of perennials and shrubs in my garden, where summer days are hot for twenty-four hours at a stretch.

In California, the people take great pride in their climate. When it was cloudy every one apologized to me, as if this occurrence were his fault. I always told them I was used to cloudiness—in fact, I like it. But this remark did not penetrate, it was too improbable.

My over-all impression of the gardens is of accent on color instead of on planting, and in many places there seems little regard for texture. However, gradually a few sober heads are limiting their planting and are growing either native plants or plants that have similar texture and habit of growth with each other. This results in far more unity and harmony. Jack Evans, a landscape gardener, told me most people in Los Angeles cannot have elaborate gardens because of the scarcity of gardeners. They want their grounds laid out in a functional manner, to be as attractive as possible and to require the least labor for maintenance.

I arrived in Los Angeles the last day of February and returned home the first week in April. While I was there, the live oaks were coming into new leaf and the fields were a brilliant chartreuse-green. Except for roses of which I saw only a few, it was the right time for the horticultural part of my visit.

The first garden I saw in Los Angeles belongs to my daughter and her husband, Mr. and Mrs. Jack Rayel. The palms and eucalyptus in it are tall, because the place is old according to Los Angeles standards. The plant material in it is so typical of what most newcomers have that I shall describe it. The garden measures about three quarters of an acre and is well planned, having a green stretch of lawn in the back and more lawn in front broken by a swimming pool. The whole place is enclosed with planting and in spite of the number of plants does not look crowded. My daughter loves color—and her place is bursting with blooms on plants that come from the far corners of the earth. For climbers over her fences there are roses, *Gelsemium, Bougainvillea,* two kinds of *Solanum,* and, as in many Los Angeles gardens, pyracanthas have been shaped to lean against walls. Among the trees are *Fremontia,* a handsome guava, a large magnolia, several orange trees, and some avocados. Of shrubs there are oleanders, gardenias, camellias, many roses, *Cytisus canariensis* with bright yellow fragrant flowers, *Dendromecon rigida* (called tree-poppy) with large yellow flowers. For ground covers there are *Hedera helix, Vinca major,* and *Fragaria chiloensis,* but fortunately no lantana which practically covers some places as if there had been a lavender flood. Of bulbous plants there are calla-lilies, strelitzias, and clivias. There are annuals too, also fuchsias, cinerarias, and geraniums. I, too, was enthusiastic about the many plants that thrive there and added to the potpourri by planting lavender and rosemary bushes and one of my favorite plants, *Teucrium fruticans,* with elegant grey foliage and blue flowers that bloom most of the winter. These plants were bought from Evans and Reeves, a famous nursery that has practically every plant suitable for this area and is situated only a few blocks from where my daughter lives.

Hugh Evans had read an account of my trip to Portugal, which had been published in The Garden Journal, and had written to me. He is in his eighties, a keen gardener, and shows his British origin in his profound knowledge and interest in plants. As a young man he had been in the real estate business. When the depression came, his hobby, namely gardening, became his source of livelihood.

His son, Jack Evans, studied his profession in California and France and is the author of the planting at "Disneyland" which is exceedingly clever; each of the four portions, "Fantasy-land," "Adventure-land," "Tomorrow-land" and "Frontier-land" are planted with distinctive and suitable material. His own garden adjoins the Will Rogers Park and is laid out on one side of a deep gulley through which a stream trickles, a most unusual feature for this desert-like region where practically all growth depends on artificial watering. Mr. Evans is an authority on fuchsias and right now is growing about four thousand plants under the shade of live oaks and other rare and unusual trees. Among the fuchsias are vine-like forms and also tall and low shrubs. Most of them have very large flowers and bloom from April to Thanksgiving. He is engaged in trying to produce a form with blue flowers. Mr. Evans also collects and grows magnolias and acacias. All through the planting are exquisite forms of eucalyptus, some with deep red flowers. Also in his garden were ceanothus, New Zealand veronicas, and a shrub with roseate bloom, called *Leptospermum scoparium* var. *rubrum,* from Australia and New Zealand which I was to see in many other gardens. Here and there were clumps of pale blue *Iris fimbriata,* which blooms several times a year. There were only a few narcissi and practically no perennials. In summer the banks of the gully are colorful with naturalized California wild flowers. This garden can be visited upon request.

Not all home owners have given up their interest in the fine art of gardening, due to the lack of labor. There are people who love gardening and do most of the work themselves. Among them are the members of the Southern California Branch of the Herb Society of America. Besides caring for their own gardens, they have a group project to plant and maintain a very large herb garden in the Los Angeles State and County Arboretum at Arcadia, not far from Pasadena. Here a great many species of salvias, all types of rosemaries, and countless herbs and many native plants used medicinally by Indian and Spanish settlers are grown.

An outstanding member of the group is Mrs. Arthur D. Richardson, who is known for her exquisitely fragrant sachets and potpourris made from the plants she grows in her lovely garden. Her garden is situated on a hilltop in Altadena and has the higher hills behind it and a far view to the front. Over the years Mrs. Richardson has mingled native plants exceedingly well with herbs and other exotics, Euphorbias are combined with creeping rosemaries. Very kindly she wrote out the list of her native plants, which is given on page 163.

Another hill-top garden belongs to "Mirandy," Mrs. Fred Bauersfeld, who for many years was on the radio for the United States Department of Agriculture, speaking in accents of the Tennessee mountain folks and describing the crafts and ways of these people in a delightful fashion. She is slight, lively, an endearing person, has no trace of southern accent, and enjoys going on trips to foreign lands. A feature in her garden in Santa Barbara is a fan-shaped planting of herbs.

Santa Barbara is so full of charming gardens the whole town is like a garden. The president of the National Herb Society, Mrs. Leslie A. Stephens, lives there. Mrs. Stephens specializes in thymes, and her garden has a definite plan and gains thereby as does that of Mrs. Lockwood DeForest, whose late husband was a landscape architect and the nephew of the former president of The New York Botanical Garden. The form of rosemary called *Lockwoodi,* which is medium-high and a cross between the tall bushy type and the trailing *repens,* originated here. The garden is on an axis with the picture window of the living room. This portion of it is horseshoe-shaped, rises up to form a little hill, and is planted with natives. From here a tree-shaded walk planted with a fine collection of California iris leads out into the sun to an alley bordered with lavender bushes, some of them of rare types, and having the beds on either side filled with choice plants. I appreciated the strictly architectural plan of these two gardens, after having seen so many naturalistic, more or less casual placing of bulbs,

Tetrapanax papyrifera, a small tree from Formosa, against the house; the spear-lily, *Doryanthes Palmeri,* a succulent from Australia, in the foreground—in Jack Evans' Los Angeles garden

shrubs, and trees in other gardens. These two women do almost all their own gardening.

A well-planned garden on an impressive scale belongs to Miss Gwethalyn Jones. Green lawns contrast dramatically with distant hills on one side and the blue Pacific on the other. The main lawn in front of a stately old-fashioned house is planted with formal beds of highly colorful annuals. Among other gardens I saw on a tour conducted by the Recreation Centre of Santa Barbara was one belonging to Mr. and Mrs. Harold Chalifoux; there the swimming pool was set amid a collection of succulents, and cypripediums and cymbidiums were growing happily in the ground under the shade of trees.

While in Santa Barbara I lived near enough to the botanical garden to be able to drive up to it and then walk home. I went there frequently to study, because the entire planting consists of native Californians, including deciduous and evergreen trees. The garden is situated in a ravine with a brook. There are shaded and sunny portions, each with appropriate plants. A meadow in the sun is covered with the glossy foliage of *Fragaria chiloensis;* and although *F. chiloensis* flowers, it does not fruit and is much used as a ground-cover. Along the margins of this meadow and sometimes in among the strawberry plants are dainty California annuals.

In the shaded portion *Iris innominata* and *I. Douglasiana* were in bloom, and sturdy stalks of lilies were coming along. Off to one side is a collection of ceanothus, forms with violet sprays of blooms, some of them tall, others medium-high, and some even prostrate. The hills behind the garden were white with ceanothus, with a patch of the lavender-flowered forms here and there. In these hills and also in the garden are specimens of the closely-related *Rhamnus cathartica,* coffee berry, a deciduous shrub or low tree with yellow-green flowers to be followed by black fruits used medicinally by Indians. There is a goodly collection of native currants; among them is *Ribes speciosum* with evergreen glossy leaves and red fuchsia-like flowers drooping from arched branches; and *Ribes malvaceum* (called chaparral currant, chaparral means low thicket); I starred this every time I saw it in my notebook. The leaves are bristly and rough above and the flowers rose-colored. Alas! It is not hardy, though a closely-related and not nearly as handsome a form, *Ribes sanguineum,* with almost red blossoms, grows happily in my garden. *Berberis Nevinii* with greyish leaves is attractive. A reclining plant, *Arctostaphyllos Hookeri,* with roseate stems and flower stalks, was the first of the western bearberries I had seen in the flesh and very attractive. There are also some herbs and their relatives; among these *Trichostema lanatum* with fragrant foliage and *Artemisia pycnocephala* stood out. Off in a corner is a section labelled "Planting for a Home Garden."

The botanical garden is fortunate to have Dr. Katherine Miller as its curator. She is a tall attractive young woman, a Ph.D. in botany, well fitted through her training and personality for the position.

An outstanding day of my trip was the one I spent at Lompoc, fifty-five miles north of Santa Barbara. To reach it I drove part of the way along the coast where lemon trees grow and are harvested at intervals the year around. I saw trucks that looked a little like "Black Marias" filled with Mexicans, with their ladders stacked behind them, being taken out to pick the lemons.

Inland the hills were entirely green, having been planted with barley (I was told) and then having been closely cropped by grazing animals. The contours of the lawn-like grassy hills were broken by clumps of rounded oaks. Every now and then I glimpsed a cowboy riding among the cattle. The scene was so peaceful and looked so man-made, it reminded me of pictures of romantic gardens in eighteenth-century England where landscape architects, like Humphrey Repton, introduced cattle to heighten the rural effect. I was told that later in the season the hills will become golden (we would say "brown") and the cattle will be moved in trucks to more northerly and easterly pastures.

I had long wanted to go to Lompoc to see where flower seeds are raised to be sold throughout the world, because of an experience that occurred many years ago. One summer in Scotland I had seen hedges of sweet peas eight feet high and had been so impressed that the following spring I ordered sweet pea seeds from an Edinburgh seed house, hoping to attain the same results. Leonard Barron visited me that summer, and I told him with great pride where I had bought my seeds. He smiled and remarked to my great surprise that practically all sweet pea seeds are raised in California.

Lompoc is situated on land as flat as a table which extends for many miles.

A section of the "Workshop"—experimental and breeding block of marigolds with best specimens selected for further development —at "Floradale Farms," Lompoc, California. Such plants are caged against insect pollination

Burpee's F hybrid petunias being grown for seed on "Floradale Farms."

Here in Santa Barbara County, as also farther south in Ventura County and again north in the San Joaquin Valley, is situated the industry, or perhaps I should say the horticultural undertaking of growing seeds of flowers and vegetables on a grand scale. Bodger, Dunholm, and Burpee have plants at Lompoc, while Ferry Morse is in the San Joaquin Valley. As with every horticultural practice in California, the seed raising is carried on in an entirely scientific and efficient manner.

I turned in at "Floradale Farms," which is Burpee's, because I buy some flower seeds from them. Walter Manfrina, the manager, showed me through the plant. There were no flowers in bloom, for it was March nineteenth; instead it was the time for sowing and transplanting seeds which was exactly what I wanted to see. Much sowing had already been done.

All the labor for this vast enterprise, except the cleaning of seeds and baking of soil, is done by hand. About ten girls were transplanting petunias while I was there. Most of the laborers are of Mexican or Japanese origin. The soil for all seeds is baked in a machine invented on the place. Seeds are planted thickly in flats, which are kept in greenhouses; and germinate in three days. Some, of course, are planted right in the fields. The seeds in the flats are transplanted as soon as they are big enough, sometimes before the second pair of leaflets, that is the first true leaves, appear. One hundred seedlings go into each flat. The top layer consists of a substance similar to vermiculite. The water for them contains the chemicals required for growth and is sprayed on in a fine mist. When they are big enough, the plants are moved into the fields.

The Burpee Company had advertised they would give a prize to whomever would find a white marigold. In response to this three hundred people had sent in seeds. Each sample, tagged with the name of the sender, was being grown in a greenhouse. As yet no white form had appeared, but there had been some interesting variation from the types.

Every seed is not sown each year, for some seeds remain viable for two, three, or even four years and are sown at these intervals. Seed waiting to be sown is stored in jute bags in a long dark loft in a concrete building. The loft is kept at fifty degrees. Bags and bags are there. Seed that is no longer viable is thrown out. But seed ready to be sold is packed in one hundred and twenty-five pound bags, mounted on the company's own trucks, and distributed across the country to retailers who pack and advertise it.

I wondered where a retail seedsman, like Joseph Harris from whom I have bought vegetable and flower seeds for years, buys his seed. So I wrote and asked him. He answered me as follows:

> "We do get quite a few flower seeds from California and several of them are grown at Lompoc, more from Oregon, and the biggest lot in terms of pounds from Idaho, where the beans and sweet corn seed are raised. Here on our own farm we raise certain specialties like our own tomatoes, some peppers, squash, and cucumbers, and also raise the parent stocks which are used for the production of western crops in many cases. In this way we control the breeding of lines under our own conditions but also take advantage of the better climate for seed growing in the West."

Everyone who goes to California visits the missions. They are all delightful, partly because of the peaceful atmosphere prevailing in them, an atmosphere derived perhaps from aloofness and from the presence of lives dedicated to religious practices. The mission at Lompoc, called *"La Purissima Concepcion"* has a large garden with a wide central path and is planted with many herbs. Among them I saw one called "mansa." There was also *Yerba santa, Yerba buena,* huge plants of rue, some of them three feet across, and large bushes of rosemary. The garden no longer belongs to the church but to a local agricultural organization and looks neglected, as happens so often when the people who loved and planted the garden no longer take care of it.

A second mission with a charming garden is *"San Juan Bautista."* The mission is in the corner of a quaint square which has buildings dating from the "Gold Rush" days, such as the hotel with its barroom, stables, and so forth.

At Carmel I visited Lester Rowntree whose poetic and informative writings about her adventures in the High Sierras, where she goes to study and collect California plants, have long been favorite reading. Mrs. Rowntree loves solitude, out of doors, and spends weeks on end camping in wild places. She is almost aggressive in her independence and deeply cultivated; is little, has curly brown hair, brown eyes, and brown sunburned skin, and when I saw her was dressed in brown khaki. Her house and garden are high on a hilltop with mountains behind and the

(Continued on page 163)

New Things In DWARF BEARDED IRISES

By Roy Davidson

AMONG THE most valuable garden flowers of early spring, the dwarf bearded irises have been grown for years for their unfailing bloom, their jewel-like colors, and their fragrance. There is something new among them these days—colors and patterns heretofore unknown to these small irises, making them even more important and valuable in today's gardens.

Whereas the older ones, being almost exclusively of the species *Iris Chamaeiris,* were either purple or yellow, with a few blues and poor quality whites, these new ones of garden origin, coming from *Iris pumila* and other central European dwarf species, are appearing in nearly every conceivable color known to irises and in some that are unknown to any others. And, furthermore, they are as easily grown as they ever were and increase even more rapidly, if that is possible.

The forerunners of these garden plants are as charming as any wild flowers should be and are of a rather closely related group of plants belonging botanically to the Series Pumilae of the Pogon (bearded) irises. While there are some other bearded iris species that are rather short in stature, they are generally possessed of a branching stem, which does not allow them to present that very low, neat effect we have come to associate with the true dwarf beardeds as of great value in gardens. Among the species are several which are possessed of no stem at all, or very little; they raise their blossoms above the foliage by elongation of the perianth-tube, that part of the flower between the ovary and the floral envelope which we think of as the true flower. They compensate for what might seem a relative scarcity of bloom, being unbranched, by producing several to many flowers, up to eight, from each rhizome, whereas the taller branched species produce but a single stem.

The most important single species of the stemless group is *Iris pumila.* The true plant of this species is only three to six inches in total height, a native to Hungary, Austria, and Roumania and to the east in the Crimean peninsula. Though the name has been in use for years in this country, the true plant is of relatively recent advent. These are the earliest of the dwarf beardeds to blossom, sometimes appearing in the snow, and are of particular interest in that genetically they carry a factor for a "spot-pattern" on the falls, which is responsible for many interesting combinations of color. Closely allied to *I. pumila* is *I. attica* of Greece, a very similar-appearing diploid species.

Alike in being stemless is *Iris mellita* from Albania, the Balkans, and Turkey, the members of which share short, very curving or falcate leaves, and flowers with very prominent erect standards and short recurved falls, which appear even shorter for being rolled under. This species comes in smokey tints of bronze-purple or yellow for the most part, and one form, called *I. rubro-marginata,* has the edges of the leaves colored a bright red. Similar to the mellitas, but having a true stem below the ovary, is *Iris Reichenbachii,* a species from the Balkans and very little known as yet in horticulture. Although several plants have been distributed under this name, it is doubtful if any so far is the true species.

Iris Chamaeiris from the Riviera coast of France and Italy is a taller and larger plant in every way than any mentioned so far, and with its flowers usually purple or yellow, occasionally whitish. Allied with it and growing into the mountains nearby are the similar *Ii. olbiensis* and *italica,* larger and often bearing a branching stem. The true *Chamaeiris* is quite dainty and desirable as a true dwarf. Natural hybrids of this with *I. pumila* have been collected, some of them quite blue in color. *I. Chamaeiris* is of great interest in that it has two dissimilar sets of chromosomes, which make it possible to obtain breeding results unknown in using any other species. It is vigorous and easily grown in all garden conditions, as are most of its hybrids, is the latest of the true dwarf species to flower, and is distinguished in having a true stem some several inches in length and a consequent short perianth-tube, giving a total height greater than most of the other species, eight to twelve inches.

There are several other almost unknown species, among them *I. subbiflora* from the coastal areas of Spain and Portugal, *I. pseudo-pumila* from the south of Italy and nearby Sicily, both similiar in appearance to *I. Chamaeiris,* and their potentialities are being investigated by the plant breeders. Yet other species not in cultivation are known only from the herbarium specimens and are being sought after in their habitats.

A related group of the Regelia irises are dwarf in stature, bearded, and furthermore produce hybrids with other dwarf bearded species and so are considered with them in a horticultural grouping. These include *Ii. arenaria, Bloudowii* and *flavissima,* all very similar, and differentiated from the species of Series Pumilae by their stoloniferous rhizomes and in having only bright yellow, short-lived flowers. They differ in their cultural requirements in being particularly disdainful of wet conditions and require the drainage that a coarse sandy soil provides, though the hybrids with other species are more amenable to a variety of conditions. Their flowers, though lasting but a few hours, are charming, a sparkling clear yellow, with golden to orange beards, and standards that flare open to show the styles. Flowers of the hybrids are long-lasting.

As is usual with garden plants, the breeders have experimented with all these and have produced some exciting new varieties, many among them more desirable in the garden than the majority of the wild ones. The collection and improvement of these plants make an interesting story and herewith by color groups is given some of the results of this work, listing of the best ones to grow, not all new, but the best of the older ones as well.

In the white to cream class, 'Snow Fairy' is the earliest, a pumila very free of bloom and about five inches in height. 'Schneecuppe' and 'Bride' are the better of the standard chamaeiris varieties, and 'Cream Flare' and 'Moongleam' are the best cream chamaeiris. Among the yellows, the best pumila varieties are 'Carpathia,' chrome-yellow, and

'Hanselmayer,' a clean lemon, one of the few pumilas to show no spot on the falls, 'Zwanimir,' golden-yellow, and 'Honey Bear,' rather a butterscotch-yellow. Among the later varieties in yellow are 'Path of Gold,' a clear clean self of all good qualities, and 'Orange Glint' and 'Bright Spot,' both tending to orange-yellow with orange beards. 'Keepsake' and 'Tiny Treasure' are the better yellows with arenaria blood and the open standards. The former is chrome-yellow and the latter a greenish golden-yellow. 'Inchalong' is a tiny charming miniature, a mixture of the blood of the three species, *Ii. Chamaeiris, pumila* and *mellita,* and a soft yellow with a huge paler beard. There are several varieties with white standards and yellow falls; 'Gay Lassie' and 'Little Elsa' are good among them, the former having the spot-pattern of *I. pumila* showing as a large yellow area in the falls and a complete white border around the edge of it.

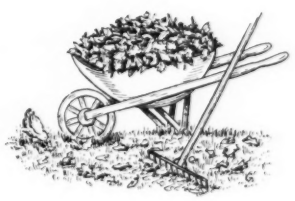
Green flowers in dwarf bearded irises are not at all unusual. Many will ask, Why a green flower? These are in tints of chartreuse and are an addition to the garden picture, among them 'Dirty Face,' 'Green Petals' and 'Green Sprite.' The spot-pattern is evident in 'Green Petals,' with a border of paler color surrounding the falls and matching the standards. The spot in the variety 'Dream Child' is yellow on a light blue ground color, and the blue color is repeated in the blue beard.

Blues, once the scarcest color among the dwarf bearded irises, are now available in good numbers and are becoming increasingly better with the new varieties of each season's introduction. The old favorite *azurea,* one of the collected hybrids between *I. Chamaeiris* and *I. pumila,* is still good, but there are some which are better. 'April Morn,' 'Blue Lilt,' 'Nosegay' and 'Flaxen' are among the newer blue pumilas. 'Blue Mascot' remains one of the best blues in the chamaeiris group, with 'Buzzer' a good one in the darker blue range.

Purples are frequent in all the species except *I. arenaria* and so, of course, is as frequent in the hybrids. The pumila 'Sulina' is a good one with a rich blue beard; 'Stint' and 'Violet Gem' are good, too. Among the later-blooming group 'Mumbo' and 'Violet Night' are tops and 'Stylish' is the all-around award winner in the purple chamaeiris class. The red-purples are as important; the collected hybrid *atro-violacea* is a fine one still in spite of being over a hundred years old. 'Alinda' is also a good one, and among the chamaeiris, 'Blazon' and 'Butch' are good. 'Blazon' is unique in having a pattern of gold lines radiating out from the gold beard to make it quite individual. In the arenaria group, 'Tampa' is one of the last to flower, was for years called the reddest dwarf, and is still quite worth having. 'Beauty Spot" is a representative of yet another hybrid group, a member of the Oncocyclus irises of Palestine crossed to the dwarf bearded species, *I. Chamaeiris.* These have some of the exotic coloring of the Near East parent, and 'Beauty Spot' is an irridescent red-plum color, an award winner.

Red is one color lacking in irises, yet some of these dwarfs approach it. 'Red Amethyst' and 'Garnette' are the closest so far, and the older chamaeiris 'Heatherbloom' and 'Tiny Tony' are bright bronzy red-purples once considered quite red. There are several which are quite close to black, among them 'Little Villain,' 'Little Joe' and the stunning new 'Black Baby,' one of the best of the chamaeiris.

Variegatas, in irises, are those with yellow standards and reddish or brownish falls. Among the dwarfs, the variegatas are especially jaunty and charming. 'Three Coins' and 'Veri-Gay' are favorites. When these bicolors are white and purple, they are called amoenas, and among them 'Sparkling Eyes,' with the falls a rich blue-purple bordered white, and 'Cherry Spot,' with the falls a redder shade bordered white, are popular. Among the browns (yes, there are brown dwarf iris, too) 'Little Mohee' is the favorite chamaeiris and 'Buster Brown' an excellent arenaria derivative. There are several colors with only one or two representatives so far. Lavender has few representatives; 'Lavender Dawn,' a mellita hybrid, is one of the few. 'Grandma's Hat,' which has lavender standards and plum-plush falls with a lavender border, is quite a charmer.



There are few approaching pink, and none in the so-called flamingo, or seashell or baby-ribbon pinks, so much in vogue in the tall bearded irises today. The closest approaches are 'Rose Petite,' a rose-red hybrid from *Ii. mellita* and *pumila* breeding, and 'Promise,' a lovely blend of cream and orchid-pink, an arenaria hybrid. There is yet another color pattern, similar to that of the taller Regeliocyclus hybrids, and coming from them, in which the entire flower is a reddish purple netted all over in a deeper shade; 'Okon' and 'Kumon' are quite exotic representatives of this group.

In these days when low maintenance is one of the important considerations relating to garden items as well as to most other items in our daily lives, it is good to come across a group of plants which give so freely of themselves. The dwarf irises suffer from scarcely any pests or diseases and grow easily in a variety of situations except that they will not flower in shade. In their native habitats, they grow among stones in sub-alpine conditions and in our gardens they look well among stones with other alpine plants. They make ideal edging plants or facing plants in front of flowering shrubbery. Companion plants should be chosen with care, for dwarf irises will not tolerate being crowded or smothered by rampant mats or creepers. They are happiest in a position of full sunshine, on a bank facing south, and the soil should drain readily for best growth. They are heavy feeders and since, being dwarf, they have short compact root systems, soon depleting the nutrients in their immediate surroundings, will do better for a generous feeding of a balanced fertilizer in early spring, and whenever replanted. Transplanting should be undertaken in early summer, as with other bearded irises, and is not a difficult task; merely break the plants apart down to a single fan of leaves if you wish and replant, keeping the soil moist immediately after to insure that the roots take hold well.

Companion plants should be chosen for contrast of texture and color of foliage as well as color of flower. The Megasea saxifrages, now called *Ber-*

genia, offer contrast of both foliage and flower; their rose colors offer a complement in that rose is lacking in the iris colors, and the bold bronzy green foliage contrasts nicely with the spikey green iris leaves. The grey velvet foliage of *Aubretia* is a pleasing contrast to iris, the colors blending rather than contrasting, when in flower. Various of the short phloxes, such as the rosy red or white *P. subulata,* the rose or blue *P. stolonifera,* the blue or white *P. divaricata,* are in the best possible taste with the dwarf irises; and the bronzy foliage and blue spires of *Ajuga reptans* is a splendid complement, although it and *Phlox subulata* can become a smothering blanket if not properly planted, sufficiently distant and down-hill from the irises. The Juliae primulas offer a pleasing contrast when planted with irises, and tolerate the sunny exposure to a better degree than any other of the primulas. Furthermore, they are in better scale with the irises than are the larger polyanthus, which do not like the open exposures. Many of the really prostrate sedums are fine cover for the dwarf irises, particularly those with glaucous foliage, making a very good contrast to the green iris leaves.

There are few plants in our gardens which give so much and ask so little. They are in perfect harmony and accord with the conception of what belongs in today's gardens, the trend to low masses in planting with greater feeling of space. Furthermore, they are attractive masses of foliage when not in flower, need never be apologized for. But best of all, they grow easily and are among the true aristocrats of the garden—and for spring color, there is nothing that can touch a well-planned collection of dwarf bearded irises.

ROSES

In The Home Landscape

By Bryan Taylor

Based on the talk given by Mr. Taylor at the Spring 1956 meeting of the American Rose Society in Portland, Oregon.

All too many of us, loving roses as we do, follow the Foster-Melliar idea that he didn't care where his roses grew. They could grow in the vegetable garden, if only they were good roses. But I do know we miss in design by not making better use of roses. When we plan a garden, we plan it around certain axes. The major axis runs, say, from the terrace to the far corner of the garden, and where the major axis terminates is the feature or focal point. That is the place to locate a lovely rose garden. Make it an *absolute feature* from the terrace.

And remember that the art of design is combining all parts into a pleasing whole — composition, in other words. To achieve this, one thing above all else is needed, and that is segregation. Segregation is the frame for the picture, the pedestal for the statue, and, in this particular case, the cutting off of your garden from the neighbors' property to get your own picture. Climbers are most effective for this purpose — two good varieties are 'Picture' and 'Guinèe.' The latter is a very dark red but, unfortunately, all too rarely seen. The bud form is an exquisite velvet red. Réveil Dijonnais, a bicolor, is another fine climber. (Grow climbers as flat as possible; do not let them grow upward. Unless they grow horizontally, most of the blooms will be at the tips of the canes.)

And then you can use Dr. Lammert's grandifloras as hedges, in masses, preferably one of a kind; not mixed which gives a "plum pudding" effect. It is what we use in our garden to lead up to our focal point of hybrid teas and our show roses. You can't find a finer hedge, to my mind, than one of grandifloras or floribundas, and variety 'Frensham' is particularly good.

We use, instead of perennials, floribundas such as 'Fashion' and the old 'Folkestone.' What a pity the last named variety is disappearing — it's such a good rose. You can use 'Vogue' and other floribundas in this way.

Most of us start gardening with annuals, pull them out in the fall, plant more annuals the next spring. From annuals we move on to perennials. Perennials are beautiful, yes; but unless one has plenty of land and a permanent gardener, it is difficult to keep them looking trim. There are few perennials that really earn their keep. To earn its keep in the garden, any plant must have a remarkable season of bloom, or a beautiful leaf, or a distinctive branch or line pattern, as with certain deciduous trees.

Perennials, on the whole, are comparatively "short-flowered" and have to be divided every so many years and replanted. How much easier it is to use floribundas and enjoy a continuous bloom for several months with minimum attention!

I would rather grow one thousand floribundas than one hundred chryasanthemums. I love chrysanthemums—and in my youth! Well, when young, one has time and energy to do all the disbudding, to stop them at the right time, to tie them up, and so on. But one gives up family life and vacations to grow chrysanthemums.

Apart from using roses as a picture or focal point in garden design, don't forget that there are certain roses which combine exremely well with the tailored planting in the front of your property. A rose like little 'Pinkie,' for instance, with its highly polished foliage is just the plant to mass with broadleaf evergreens of similar texture. And you can get a fascinating effect by using other plants with floribundas. For example, the grey-leaf *Senecio laxifolius* can be planted as a carpet beneath 'Fashion' or 'Rosenelfe' or 'Lilibet'. The pink roses above the gray foliage are very effective (in cold weather, *S. laxifolius* will die out; but move one plant inside, take cuttings in January, and set them out in spring). Another delightful companion for that good yellow floribunda we're still looking for is *Hebe elliptica* 'Autumn Glory'. We knew this plant as a veronica for a number of years, but the botanists decided it was in the wrong family—so now we must call it hebe. By whatever name, it is a fine broad-leaf evergreen about eighteen inches high by two feet across, with spikes of violet-blue flowers, and a lovely carpet for yellow roses or floribundas with a blue-pink color. When I say carpet, I don't mean edging—I mean planting rows of roses and putting the "carpet" plants between them.

(Continued on page 163)

September 1, 1957

DEAR FRED:

I was thinking of you only the other day as I was being chased around the greenhouse by an over-stimulated passion-vine. I recalled the predicament you were in last time I saw you some eighteen years ago, and wondered if you had ever escaped. And now here you are again, in answer to my thoughts (clearly this is E.S.P. at its best) and I am happy to find that you are still engaged in the same horticultural . . . . shall I say "pursuits?"

It's time you got out of there, Fred, and I need a person with your intimate knowledge of vines and their envolvements in my greenhouse. There are some galloping greens that are just about out of control; not having someone like you to latch onto, they have gathered up around the rafters and are embracing one another with untidy ardor. With your unique history of the past two decades, you're just the fella who can tell me where to start hatchetting. So I am sending you today two machetes (a right- and a left-handed one), a pair of dentally-operated wire-cutters, and a one-way ticket to our town. (After you've hacked your way out, please pay the express charges.) And don't worry about your lovely missus; obviously she hasn't been any help to you, and anyhow everybody but you knows what *she's* been doing since the early forties.

Before we go further I should tell you that you're not the only expert on vines. There was another man, some years ago, whose patient attention to them was equal even to your own; furthermore, he escaped far enough from them to ponder other subjects and to write a number of books. His name was Charles Darwin, and his little book CLIMBING PLANTS describes in minute detail the various methods by which plants climb. Inasmuch as he may have a slightly different point of view from yours, I thought it would interest you to know that he classified these plants according to the method by which they climb.

The first and largest of Professor Darwin's categories is the Twining Plants. This includes most of the very large *Convolvulus* family, the jasmines, wisterias, stephanotis, and other familiars. The aristolochias are interesting members of this group with their odd flowers, sometimes tailed, as *A. grandiflora*, which is said to resemble a pelican. *Manettia bicolor* is a lean and controlled twiner which will make fine use of a single string in a greenhouse, bearing bright little "fire-cracker" blooms at two-inch intervals half the months of the year.

Drawing by Geo. Price © 1939 The New Yorker Magazine, Inc.

"Watch out, Fred! Here it comes again."

Some of the clerodendrons also twine, though in the shade they tend to behave like shrubs. Professor Darwin made detailed observations of the twining of *Ceropegia Gardnerii*, a plant which I have not been able to find mentioned elsewhere; in my experience most of the ceropegias will twine only if you do most of the work for them, preferring either to flop or to travel cross-country. *Bowiea (Schizobasopsis) volubilis,* a South African lily, is an interesting, tight little twiner but I have yet to see it bloom.

A marauding member of this category with whom you will be bound to feel at home, Fred, is *Senecio mikanioides,* "Mike" to you and me, but "German ivy" to those who don't care what they call ivy. This character is, bar none, the fastest-growing bit of spinach that I have ever encountered. It comes from South Africa, and I have no doubt that it introduced itself to this continent and Europe by merely growing across the oceans. It grows up and down and sideways with equal abandon. As a pot plant it is a beginner's dream, and will be-jungle a picture window in a very few months. It is my stand-by for our local youngsters' first experience with rooting and growing pot-plants, and our annual trips to the County 4-H Fair with these things burgeoning out of the station wagons are reminiscent of the old-time Tammany funerals.

The second group are the Leaf-Climbers which climb by means of petioles or mid-ribs. I am sure you are familiar with the way nasturtiums hook their elbows over any handy prop, while the leaves of some clematis have their own form of intimate embrace.

Gloriosas are leaf-climbers. *Maurandia Barclaiana* swarms rather than climbs—it tumbles upward. Inasmuch as it blooms the year round, it is a desirable greenhouse citizen.

The third category is that of the Tendril-Bearers, of which the grape, in its many forms, is very familiar. To get down to personalities, there is an East Indian vine of belligerent nature which conceals its humble grape-hood behind the lively nomen of *Vitis Voinieriana.* My specimen climbed largely, but conventionally, for a year or two up a post, and now it's going west

(young man) atop a beam. Every few feet it lets down long shoots, with straight, foot-long tendrils which delight in snatching at coiffures, and I assure you it's a snaky caress. Why it goes to all the trouble of climbing up something, only to come down again puzzles me, but there are members of an entirely different species who do the same thing on mountains and, furthermore, write best-sellers about it. One shoot reached down some eight feet, wrapped around a prostrate *Ceropegia Sandersoni* and lifted it several inches from the soil at the rate of one or two wrap-arounds per day. I was eagerly awaiting the outcome of this small struggle, when a young boy with flailing tendrils of his own broke up the whole show. A fresh shoot is now headed down towards a bare spot in the bench, and I have baited it with a pencil. And soon there is going to be yet another scramble; this one a collision, for vitis is headed for a position securely held by a dignified *Aristolochia elegans* (a twiner) which has had the forethought to build itself into a plump bunch up on the beams, sizeable enough to block any rank intruder from the east. I want you to be here when this happens, Fred, as it will be the old immovable-body-irresistible-force problem, and only you can solve it. If you have ever been in the palm house at Schönbrunn, near Vienna, you will remember this vitis hanging from catwalks high in the dome and suspending thirty feet or more, searching, no doubt, for the twin with the "Toni." The *Cissus* group, cousins to *Vitis,* contains many members which are an addition to any greenhouse. Like the senecio, many of them are mis-nomered "ivy," such as the "grape," "kangaroo" and "Antarctic" "ivies." An exceptionally handsome one is *Cissus discolor,* which can hardly avoid being called "rex begonia vine." There was a time, a couple of years ago, when my specimen had big ideas and started taking over the greenhouse, perhaps because it became swollen with praise. I fought it bravely, and suddenly it gave up, the craven, and now it's all I can do to keep alive a couple of disinterested rooted cuttings. This may have come about because I rather tactlessly placed near it a real and very handsome rex begonia. Our vine friends are sensitive, my dear Fred, as you know. Few of these rampancies have ever honored themselves or me with a bloom, but they are worth growing, nonetheless. Perhaps with so much energy thrown into the career of just growing, they have lost interest in marriage. Or perhaps they must arrive at the top of something to bloom, and, with their unlimited ceiling, any top under an ordinary glass-house is too low. I must mention this to the Lever Bros.; perhaps their house of glass could lure them into domestic activities. But there are many tendril-climbers which are grown primarily for their beautiful flowers, such as bignonias, passifloras, and the lovely *Cobaea scandens.*

Professor Darwin's next group are the Hook-Climbers, of which there are few, but which include some roses. *Dipladenia* is a lovely member; there is a fine one at Carlton Gardens in Hightstown, New Jersey.

The fifth and last category consists of the Root-Climbers, with the real ivies, of course, in the leading position. At least one fig, *Ficus pumila* (or *F. repens,* if you prefer it) has this talent, and the professor states that *Hoya carnosa* will cling to a flat wall, although it is primarily a twiner. We must try this.

I have gone into some detail, Fred, so you'll know what you're getting into. With Labor Day past you'll be wanting to get back to work. In closing, though, I think I should tell you that I have heard from reliable sources that ever since that thing came out about you in the "New Yorker"—remember? —your wife has been in a place called Brooklyn. There's a botanical garden there, and she has been seen in quiet contemplation before some plants that grow only an inch or two in a hundred years. I believe that in Brooklyn and in another large place called Japan these plants are referred to as "bonsai." Anyhow, I'm told she's been there so long she's rooted, so, if you want to bring her along with you, you'd better drop over there and make a few cuttings. That right index-finger just below the node would be a good place. And don't forget to bring the machetes.

Looking forward to seeing you very soon,

Fondly yours,

Marjorie Wihtol

JOHN BARTRAM (from page 143)

a few miles of "Cheam," the home of Lord Petre's mother, Lady Stourton. Lord Petre accepted the suggestion and was so pleased with what he saw that he obtained seed from Sir Theodore and sowed several beds with them.

The work of landscaping "Thorndon Park" continued. An entrance drive was laid out across the Park from the north side of the house to the Colchester Turnpike. At the height of land two mounds were erected, one on each side of the drive. To the east a start was made on diverting the brook through a series of formal ponds, and on the farther side of the brook the foundation for a plantation of trees was built up in the shape of an octagon. More laborers were required to carry out this work than were available on the manor farms in July and August, and Lord Petre brought in workmen from outside. These were suspected of being Irish and were treated to a rough reception from the Essex men.

A shipment of plants arrived at Tilbury. Collinson urged a prompt unloading; but Lord Petre's foreman, Huntback, was suffering from gout and could not attend to the matter at once. Lord Petre would allow no one else to handle the plant material, and Collinson was forced to let his ship stay at its mooring for several days until Huntback recovered.

Collinson visited "Thorndon" about this time and inspected the nursery beds where Bartram's seeds from Pennsylvania had been planted. Oaks, liquidambar, and hackberry had germinated satisfactorily so that there was a good supply of seedlings. Tulip-trees and sugar maples had not appeared, nor had sassafras and white-cedar. Collinson thought that they might need another winter for incubation.

By this time, the gardens and park of "Thorndon" and the greenhouses had progressed to a point where Lord Petre wanted an authoritative record of the plant material. He engaged the learned gardener of the Chelsea Physic Garden, which Sir Hans Sloan had given to the Apothecaries Society, to catalogue the material. Philip Miller had already published the first volume of THE GARDENER'S DICTIONARY and was a recognized authority on the identification of plants.

(To be Continued)

Outdoor Chrysanthemum Culture

By Spencer Harrison Capreal

PART I

CHRYSANTHEMUMS are accommodating plants. With a little help and an understanding of their characteristics and requirements, they will perform to your heart's desire.

The purpose of this discussion is to study the requirements, characteristics, and cultural practices in the growing of outdoor chrysanthemums, together with their attendant diseases and insects which can, with some degree, be controlled by the grower.

Science in floriculture has come a long way since grandma's time. It is not, however, the intention of this discussion to review the broad and wealthy data on the biological and chemical processes in plant growth, except briefly where it can be of some help to the gardener. For convenience, we shall divide this discussion into three sections: 1. Below soil surface. 2. Above soil surface. 3. Disease and insects.

BELOW SOIL SURFACE

Soil is a mass of complexities, of biochemical activities and processes, and not a simple subject for a brief discussion, but some knowledge of the part soil takes in plant growth is necessary in any soil management program.

Besides acting as an anchor, the most important virtue of soil is its value in making available to the plant's root system the nutrient elements required for internal growth.

This relationship between soil and plant growth involves a number of factors and conditions, before plant food can be absorbed. These factors and conditions may be broadly classified as mineral soils, organic substances, water, air, nutrients, soil pH, and temperature. To these we may well add certain types of beneficial soil organisms such as bacteria, fungi, and actinomycetes, which are induced into the soil by its organic contents. Soil is a heterogeneous mass of ever-changing conditions, a catalyst that synthesizes many chemicals and gases. There is a continuous disintegration and reduction in the soil structure. The soil colloids, soil solution, and fertility are ever changing. Micro-organism population and bio-chemical activities vary with carbon-nitrogen ratio, soil pH, and temperature.

SOIL MATERIAL: Scientifically, soils have a geological history that has been widely classified. These classifications are determined through a profile perspective, known as horizons A, B, and C. "A" horizon is the top layer or top soil, which contains sufficient organic matter to promote vegetative growth. "B" horizon is the sub-soil with very little or no organic matter. "C" horizon is the lower levels, reaching the parent material (different types of rock) containing no organic matter. These classifications, by no means, run uniform to depth or organic content. They do differ in different localities.

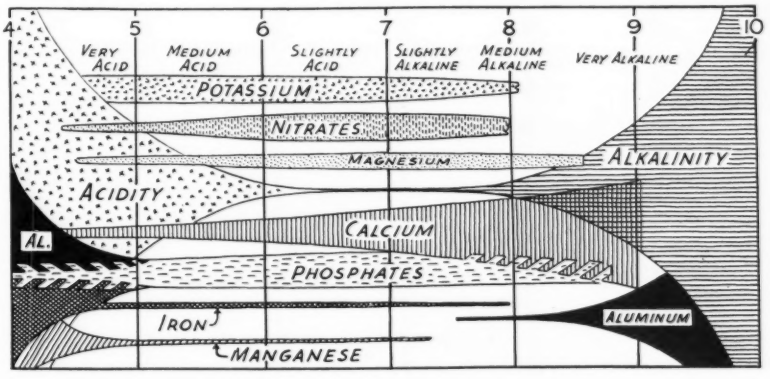
The top soil is the important consideration in soil management, with the sub-soil as a drainage outlet for excessive water. As chrysanthemums are shallow-rooting plants, six to eight inches of soil preparation is ample for good growing conditions. Where subsoil drainage is poor, an additional four inches of soil preparation would be advisable, or some other form of drainage provided.

Water and air are the most important elements to living matter. In soil preparation or amendment, the object should be to obtain a physical structure which will hold large amounts of water and breathe air. Such a physical structure can be obtained by a mixture of humus and mineral soil, with the ideal growing conditions, in this mixture, somewhere between twenty to fifty per cent of humus to fifty to eighty per cent of mineral soil, depending on the type of soil one has. Probably the optimum soil condition for plant growth would contain twenty-five per cent water, twenty-five per cent air, twenty per cent humus, and thirty per cent mineral soil.

Mineral soils are disintegrated rocks. The results of this disintegration throughout the ages are sand, silt, and clay, depending on the type of rock they came from. In general, mineral soils contain quite a number of minerals. From this disintegration caused by air, water, and certain acids, with the aid of soil organisms from organic matter, soluble compounds are produced which dissolve in the soil solution. The major portion of the plant's trace nutrient element requirements is obtained from these mineral soils. Humus is merely a definition for decomposed organic matter (animal or vegetative) which has reached a level of safety from toxic gases and competitive bacterial activity for nutrients required by plants. Humus should have granular particles that will hold considerable amounts of water and breathe air.

CHART I

The relation between soil pH and plant nutrients availability



Redrawn from Ext. Bul., 136, Va. Agr. Exp. Sta., 1935 by the late Dr. N. A. Pettinger

At best, the fertilizer content in organic matter is low, and it would be advisable to add fertilizer to the soil from time to time, for better results. Experiments have proven that organic matter with additional fertilizers grows better crops than organic matter without additional fertilizers.

Organic matter is expendable; that is, the process of decomposition, under cultivation, continues until it virtually disappears. Thus, continual replenishment is required to maintain a desirable physical structure.

All organic matter, when well decomposed, will produce a good physical structure in the soil. The durability of this physical structure may, for convenience, be divided into two classes: (1) slow to decompose, (2) quick to decompose. The durability factor involves cellulose and lignin. The greater the content of cellulose and lignin in the organic matter, the slower the decomposition and the longer lasting in the soil of the woody and fibrous parts of plants. The peats are one example. Most other organic substances decompose more quickly and unite with the soil more rapidly under cultivation.

Animal manures and composts from a variety of dead vegetation have been and are still a standby in soil preparation; but in recent years the value and durability of the peats are better understood, and they are highly recommended in soil management. Most peats have a lower pH than desirable. It would be advisable to mix some limestone with them before they are worked into the soil. Liming is best accomplished in the fall or very early in the spring when the top surface is free from plants and the lime can be cultivated into the soil. Surface applications of lime are slow to penetrate—probably not more than two inches a year. Other kinds of humus may also require liming. Have the soil analyzed. A pH of 6.0 to 6.5 is best for chrysanthemums.

Soils have their problems, too. Conditions interfere with their proper functioning. Let us see what several of the more harmful ones will do.

Carbon-Nitrogen Ratio and Cycle: Carbon and nitrogen are important factors in the decomposition of organic matter. Carbon in the form of carbon-dioxide is the source of energy for the soil micro-organisms. Nitrogen is its principal nutrient requirement. Before decomposition sets in, most organic substances may have from thirty to ninety and even more of carbon in the ratio, to one of nitrogen. Animal manures, being a product of digestion, generally have somewhat less than the ninety to one ratio, unless a great deal of strawy matter is included. The soil organisms involved in this organic decomposition are the beneficial bacterias, fungi, and actinomycetes that can, in the presence of carbon-dioxide, nitrogen, air, and water, break down the complex nutrient elements in the organic matter into simple forms, satisfying their own needs and leaving a residue, soluble in soil solution and available to plants.

In the humification process, harmful periods can occur. Thus, when decomposition first sets in, large amounts of carbon-dioxide appear in the soil. Bacteria are activated; ammonia nitrogen is released; certain bacteria change the ammonia into nitrite nitrogen (not available to plants), and other bacteria change this into nitrate nitrogen (soluble and available to plants); but in periods of high carbon content, nitrogen is in such great demand for bacterial activity and multiplication, that the reverse of the process can take place, thereby competing with plants for nitrogen. This could greatly reduce, or even deprive the plant of its nitrogen requirements. There are also several toxic gases that are produced in these periods of high bacterial activity which can injure or even kill growing plants.

The above gives you the reason for the general recommendation to use humus in soil preparation. Humus is the end result in the process of humification that has lost carbon-dioxide through the soil and reduced the carbon content of the organic matter to the ratio of eight to fifteen of carbon to one of nitrogen, and has a good granular structure.

Soil pH: The general recommendation is a soil pH of between 6.0 to 6.5, and the use of a number of elements to raise or lower the soil pH is common. But, often the basic reasons for these recommendations are not too closely understood.

Soil pH is a part of the complexities in the soil that affect the availability of a number of nutrient elements, regardless of other favorable conditions.

The alkalinity and acidity of soils involves two elements: hydroxel (OH) and hydrogen (H). Hydroxel is the alkali factor, and hydrogen is the acid factor. Both OH and H are found in combined and free forms in the soil. In soil tests for pH the free forms are recorded, but the tests do not show the combined forms that may under some conditions be freed.

In determining the pH of soils, a convenient scale calibrated from 0 to 14, with the symbol pH preceding it, is used; pH 7 is neutral, having equal amounts of OH and H on a percentage basis. This percentage varies with scale numbers going upward or downward. Probably the most convenient way to explain the variations in soil pH is to use the OH (alkali) factor as a guide. Thus, as the OH increases percentagewise, the pH number goes above the neutral number 7, with each number having ten times greater intensity than each number previous to it. With the OH factor decreasing percentagewise, the process that takes place above the neutral 7 is reversed downward, and varying acid conditions are brought about.

The important reaction between soil pH and plant growth is availability or limited availability and unavailability of some important nutrient elements required by plants. These reactions may be broadly considered in two classifications: (1) Chemical changes that take place when soil pH is above 7.5 and below pH 5.5. Gradually as the soil pH moves above 7.5, phosphate combines with calcium and forms calcium carbonate (not available to plants). Reversing this process, below pH 5.0, phosphate combines with iron and aluminum to form iron phosphate and aluminum phosphate. Thus, these two changes greatly reduce or deprive the plants of a very important nutrient element, namely, their phosphate requirement. (2) Bacterial activity may be considered as affected by environment. The pH range of the soil appears to affect bacteria metabolism in its process of synthesizing complex chemicals into simple forms. Thus, this enzymic process is considerably reduced as it goes below pH 5.0 and above pH 8.0. Available nitrogen would be a serious problem under these conditions.

Probably the clearest interpretation of the effect of soil pH on the availability of plant nutrients was illustrated

by the late Dr. N. A. Pettinger in a chart published by the Virginia Polytechnic Institute, Bulletin 136, 1935. In studying Chart 1, it will be noted that the different elements are represented by bands of varying widths. This does not represent the proportion in quantities of one element to other elements, but serves as a guide in determining the maximum and minimum availability of each element under varying pH conditions.

It will also be noted (Chart 1) that the major nutrient elements show their greatest point of availability between pH 6.0 and 7.0 (slightly acid). It has been found that greater amounts of these major nutrient elements are also absorbed by plants between soil pH 6.0 to 7.0. However, it must not be assumed that all plants should be grown between soil pH 6.0 to 7.0 to do well. Numerous tables are available which show many kinds of plants growing well under varying pH conditions. Generally, these pH conditions average between pH 5.0 to 7.0. Chrysanthemums appear to be best between pH 6.0 to 6.5.

I should like to point out here that soil pH below 5.0 or above 7.5 will probably create some toxic conditions harmful to plants.

The problem of obtaining a favorable pH condition is not too complicated. Remedies for high or low pH should also supply some important nutrient elements to the plant.

To increase the soil pH, liming is the general practice. There are three forms of lime in general use for soils. (1) Oxide of lime (burned lime-quicklime) which reacts quickly, but should not be used on growing plants. (2) Hydroxide of lime (hydrated lime-slaked lime) is also quick to react and safer than oxide of lime. (3) Carbonate of lime, with several variations in their calcium and magnesium content. Pulverized lime-stone or dolomite is the most common in commerce. This is slower to react, but has the advantage of lasting longer in the soil and of adding a large amount of important nutrients (calcium and magnesium), and it is safe to use. All three of these liming elements are used primarily for their calcium content and ability to develop the OH factor in pH. Lime also has the ability to attract soil particles by adsorption, thereby improving the physical structure of soils. The use of pulverized limestone, containing large

amounts of calcium and magnesium, is highly recommended—but a word of warning accompanies this recommendation. Your soil may contain large amounts of limestone or other calcium-containing stones. Your State Experiment Station can tell you. In soils containing a good amount of organic matter, the application of four to five pounds of limestone per one hundred square feet of soil area will raise the pH for each pH point desired.

To lower the soil pH, there are three elements that are used. (1) Iron sulphate which is soluble and quick in its acidification. This is not used, unless quick action is necessary from a very high pH. (2) Aluminum sulphate, also quite fast, but not so desirable for chrysanthemums. (3) Sulphur is slow but economical and supplies an important nutrient, too. All three of these acid-forming elements will be more effective, if dissolved in water before being applied to the soil.

The probabilities are, in average soils, that liming would be of more concern than acid-forming materials. Plants do consume considerable amounts of calcium and with high moisture present, calcium is lost by leaching out of the soil. Thus, the soil pH is gradually lowered. In the meanwhile, throughout the year, acid-forming substances are being added to the soil (mostly sulphur) by rain, snow, sulphur sprays for mildew, and by some fertilizers that are used, especially the sulphate forms. Thus, the soil pH is lowered still more.

Soil Sterilization. Pasteurization would probably be a better term, as complete sterilization of soils is seldom obtained.

Soils that are planted year after year, and exposed to wind, rain, disease-carrying insects, hands going from plant to plant, new plants that may carry disease will eventually produce a sick soil. Sterilization, new healthy plants, and sanitation will remedy any ill condition. Sterilization will also give good weed control.

There are a number of chemicals, both old and new, that have value for soil sterilization, when properly applied under favorable conditions. Over a period of years, I have found two of these chemicals very effective. They are highly recommended. These are chloropicrin (trade name, "Larvacide") and methyl bromide with two per cent of chloropicrin. (There are several brands on the market. Follow manufacturers' directions for best results.)

"Larvacide" is more effective than methyl bromide and can injure or kill plants, if they are too close. A cover over the soil, as application is made, will help to avoid harmful effects. It is toxic and care should be taken. "Larvacide" is also available in nine-ounce bottles for small plots. It covers an area of a little less than than three hundred square feet, in ten-inch squares. A small applicator to fit over the top of the bottle is available and may be re-used.

Methyl bromide can generally be purchased in one-pound pressure cans, and an applicator must be used. One can to each one hundred square feet is the usual amount, but two cans is much more effective. Here, too, the applicator can be re-used. It is comparatively safe and simple to apply, if the area is properly covered with soil fumigation cloth. And it does not harm other plants closeby.

Steam, of course, is the most effective method for sterilizing soil. The problem with this method outdoors is its cost and equipment. For those who have a place large enough and do not mind the expense, there are portable units on the market that will do a very efficient job.

Up to this point in our discussion, we have briefly outlined the primary objectives in soil management. It may be assumed that if the soil's physical structure is good and in healthy condition, and the pH is around 6.0 to 6.5, the biological and chemical processes will function effectively, unless very cold or very hot temperatures reduce or stop these processes.

Now we come to the matter of the internal requirements of the plant—the nutrients taken up in its root system.

Nutrient Elements. Of primary

(Continued on page 170)

Bacteria caused tumorous growth on carrot disc at right. Disc at left is healthy.

At The New York Botanical Garden, fungi with picky appetites, lonesome tomatoes, and ailing carrots reveal

beneficial secrets of nature

TODAY, ON THE SCENE OF Revolutionary War skirmishes between colonial patriots and British redcoats, a vastly different kind of struggle is being waged. The clatter of ancient musket fire has been replaced by the glassy clink of modern laboratory equipment as research people at The New York Botanical Garden join in the timeless battle of man against disease.

Every year well over a million visitors enjoy the beauty of the 230-acre garden wonderland on the bank of the Bronx River; but only a relative handful is aware of the contributions to a longer and healthier life being made by the Garden's Laboratory for Research.

In their daily studies to advance botanical science, researchers are hopefully searching out new medicines, looking for useful new kinds of plants, and finding more and better ways to use plants already known. It's a challenging and virtually limitless field, for of the ten thousand known plants native to the United States alone, only one hundred or so are in commercial use.

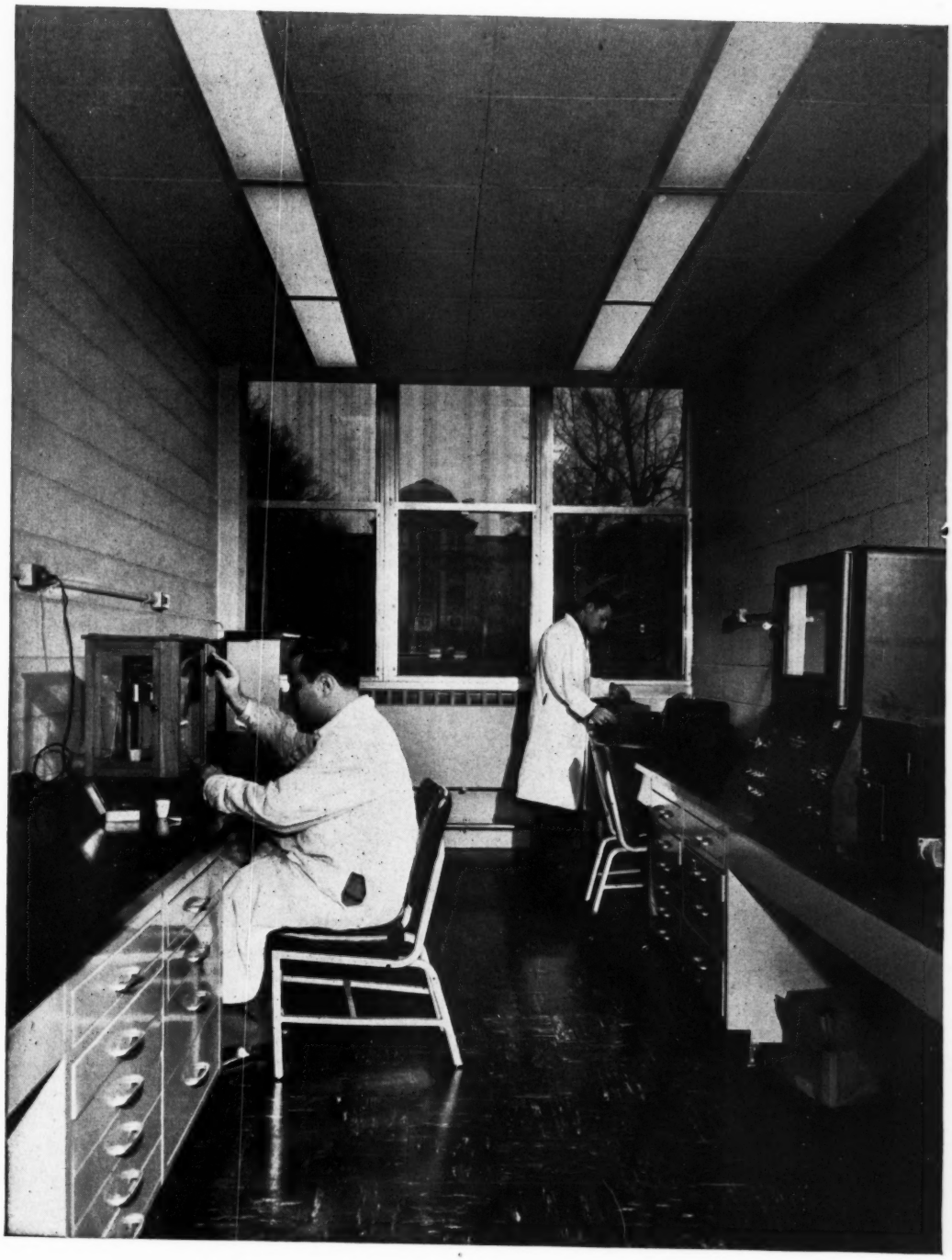
Plants are both enemy and ally of man in his conquest of disease. Bacteria, which in reality are microscopic plants, cause tuberculosis, pneumonia, dysentery, and cholera. Other plants called fungi manifest themselves in a host of today's ills, the most familiar and annoying being athlete's foot. On the brighter side, plants also are the source of quinine, morphine, digitalis, penicillin, and many other therapeutic agents.

In a new $1,000,000 laboratory building, three thousand fungi and scores of plants are subjected to various experiments as botanists and plant pathologists search for facts on cancer, nutrition, and antibiotics. Unlike white mice or guinea pigs, plants will sit still to be studied, and reveal without temperament their secrets.

A hard-working fungus may produce as many as ten or fifteen substances, each of which might possibly be the unknown factor that will solve some formerly unanswerable research problem. In the continuing attack on polio, for example, researchers at the Botanical Garden went looking for an antibiotic, rather than a chemical or a vaccine, in an effort to rob this elusive bacteria of its vitality. None was found, but in the process, a fungi-produced substance was isolated which proved to be an effective killer of the organism that causes amoebic dysentery.

This article is reprinted from Armstrong INSULATOR, *March 1957, Vol. 27, No. 1, with permission of Armstrong Cork Company, Lancaster, Pa.*

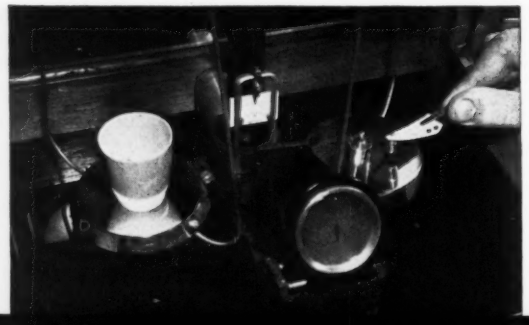
A view of the precision instrument room showing a chemical balance, a spectrophotometer, and a recording spectrophotometer.



Incubator ovens maintain ideal growing conditions for various bacteria cultures.

Room containing eight incubators is lined with 4" thick Armstrong Corkboard to help maintain even temperatures.

Extremely sensitive scales for measuring fungi growth are housed in controlled temperature room to insure accuracy.



When a new antibiotic, vitamin, or medicinal substance is isolated at The New York Botanical Garden, the information is turned over to a commercial pharmaceutical laboratory. There, actual production techniques and curative powers are further analyzed and refined.

Hope for better control of virus infections is offered by fungi-mustered substances that prevent viruses from attacking the human body which serves as their host. Some of these substances have been isolated and are being studied, and may before long be available on the pharmacist's shelf.

Current nutritional research has pointed up the need of certain bacteria for a diet other than the usual yeast and malt extracts to sustain life. This exclusive group with picky appetites won't consume such mundane foodstuffs and soon die.

However, when catered to with a diet of extracts of dry wood, they flourish. This may indicate the existence of unknown vitamins in the wood which, when isolated, may some day improve human nutrition.

Several thousand doomed carrots at the Botanical Garden are subjects for cancer research. Following the introduction of certain bacteria, tumor growths soon appear on these test vegetables. Researchers are attempting to learn what substance produced by the bacteria causes a normal plant cell to become tumorous. It is hoped, too, that a substance that will revert the tumorous cells to normal tissue also can be found. The great similarity that exists between plant and animal cells allows the findings to be used in the crusade against cancer in human beings.

Deep in an incubator at the Garden, roots of a plant flourish. They continue to grow only because of a certain, and as yet, unclassified vitamin in their liquid food supply. Previously, when the roots were severed from the top of the plant, they soon died. This indicated to the researchers that the top of the plant was supplying necessary factors for plant growth. But when extract of hog liver was injected into the synthetic food supply of the severed roots, they flourished. The question—how does that vitamin in the liver nourish the roots?

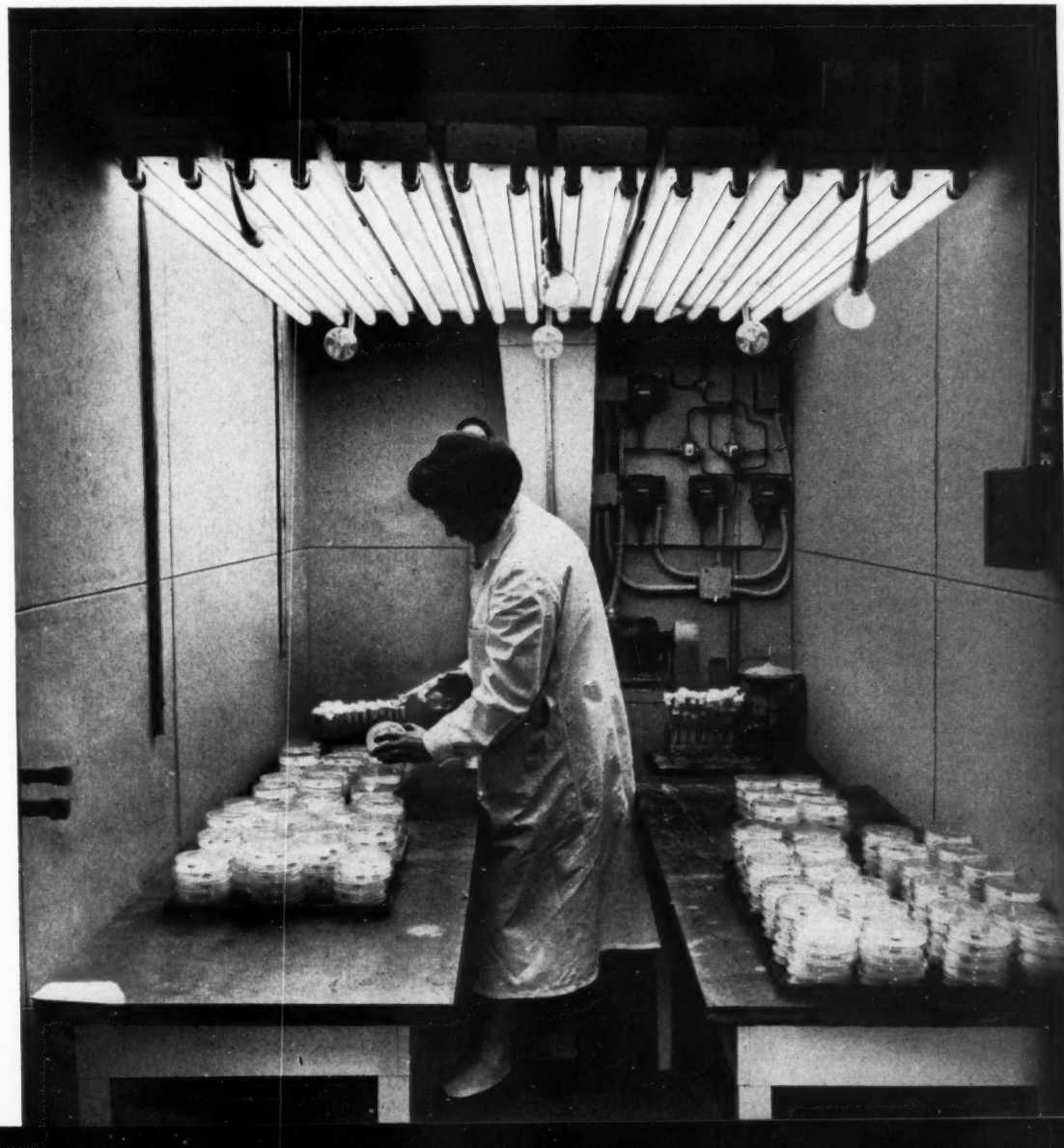
In the maintenance of test cultures and plant life all possible variables are eliminated to assure uncontaminated and controlled results of experimentation. Temperature control is of prime importance. In fact, some fungi will not synthesize their usual selection of substances if temperatures vary even slightly. For constant and effective temperature control, all of the eight rooms at the Botanical Garden's new laboratory building have been insulated with Armstrong Corkboard.

One of the rooms contains a battery of lights which can be raised, lowered, or changed in intensity and type of illumination. Here the effect of light changes on plant growth is noted. Light effect on tumor growth is also investigated, a process that would be impossible with animal subjects suffering from internal cellular maladies. Another room houses an extremely sensitive scale with which yield and change in fungi production can be noted.

Two rooms are used as incubators. Here constant temperature incubator "ovens" assure ideal conditions for fungi and plant growth. Chromatography, a system of separating the various substances produced by fungi and bacteria, is conducted in two other rooms. The remaining rooms are used for storage of extracted substances.

Already the unlikely fungi, the inconspicuous carrot and other forms of plant life are contributing vast stores of information toward the betterment of medicinal compounds, agriculture, and pure science in the new laboratory of The New York Botanical Garden.

Study of tomato roots and carrot discs may make your life longer and healthier.

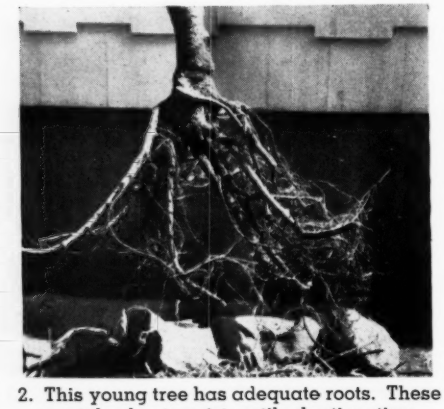


Battery of lights can be raised and lowered and intensity changed to study effects of illumination on plant growth. The close temperature and humidity control necessary in this room is aided by corkboard insulated walls, floor and ceiling.

SOME FALL GARDENING WORK

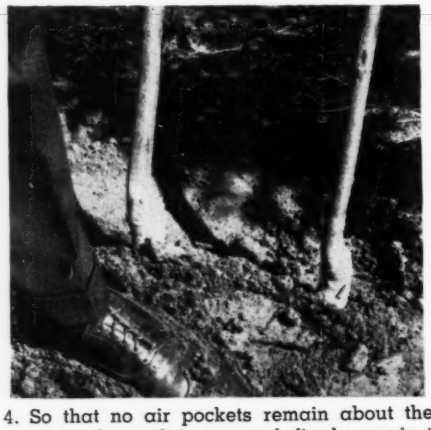
By T. H. Everett

1. Unpack plants that are received from nurseries as promptly after their arrival as possible.

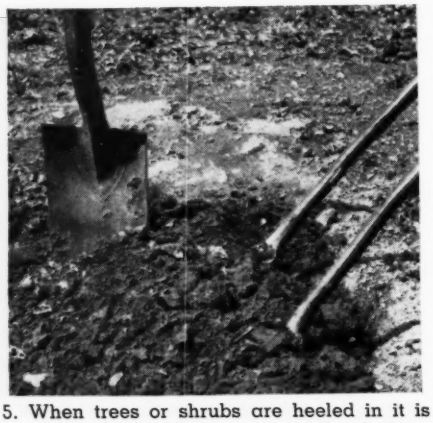


2. This young tree has adequate roots. These must be kept moist until planting time.

3. By placing the roots in a hole and covering them with soil the roots are kept from drying.



4. So that no air pockets remain about the roots, the soil is pressed firmly against them with the foot.



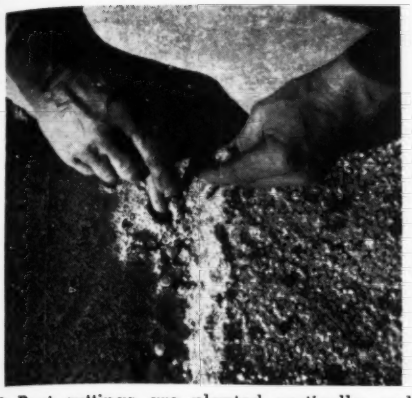
5. When trees or shrubs are heeled in it is usual to slope them at an angle of about forty-five degrees.

Heeling In

A major care to exercise when transplanting is to keep the roots from drying. Because of the frail nature of fine feeder roots they, particularly, are dessicated soon if exposed for long to sun and dry air. "Heeling in" is a gardening procedure designed to keep roots moist between the time plants are dug, or are received from a nursery, until they are planted. It consists of setting them temporarily in a trench or hole in the ground and covering their roots with fine (not lumpy), moist soil. The soil is made firm about the roots

6. Thick roots are removed from a plant of perennial cynoglossum in preparation for making root cuttings.

7. Root cuttings, about three inches long, are made with a sharp knife. Their upper ends are cut square, their lower ends slanting.



8. Root cuttings are planted vertically and closely together with peg or dibble in a sand bed, then covered with an inch of sand.

9. The following spring, vigorous top growth develops. This indicates that the root cuttings have also substantial root growth.

10. When good roots and a sturdy top have developed from the root cutting, the young plant is transplanted in a nursery bed for further growth.

and, if the plants are in leaf or the soil is somewhat dry, it is soaked with water afterwards. A lightly shaded location sheltered from sweeping winds is usually preferred for heeling in, especially in the case of leafy plants; when leafless trees and shrubs are heeled in in sunny locations, it is advisable to slope them at an angle of about forty-five degrees towards the south so that the trunks and stems are least exposed to the direct rays of the sun. Heeled-in plants are set as closely together as possible without injuring the roots. They may remain heeled in until new growth begins but should not be left so through a full growing season.

Root Cuttings

Many plants that have thick, fleshy roots can be propagated easily by root cuttings—sections of roots suitably prepared and planted under favorable conditions. Fall is an appropriate time to make root cuttings of hardy plants; the technique is simple. The roots are dug up and cut into sections two to three inches long. So that recognition is easier, it is usual to cut the top of the cutting cleanly across at right angles to the long axis of the root and to make the base of the cutting with a slanting or sloping cut. After they are prepared, the cuttings are planted vertically, closely together in a bed of sand or sandy soil, out of doors or in a cold-frame. Their tops should be an inch or so beneath the surface. After the ground has frozen a mulch of leaves, salt hay, or similar appropriate material may be placed over the cutting bed, but this is not essential. In spring both root growth and top growth will develop rapidly. Before the leafage has advanced too far, the young plants should be dug up and planted in soil nursery beds to make further growth. Among plants with thick, fleshy roots that are readily increased by root cuttings are anchusas, oriental poppies, cynoglossums, and horse-radish.

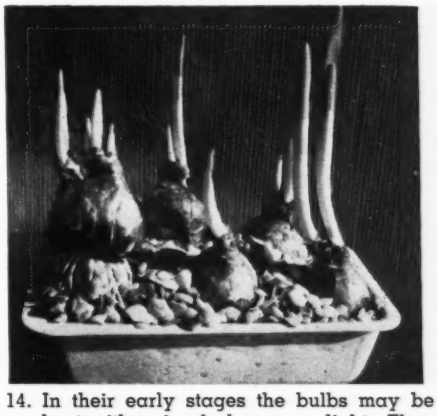
Bulbs in Pebbles

An easy way to have home-grown flowers in winter is to plant certain kinds of narcissi in pebbles or pearl chips and water and to force them into early bloom in a sunny window. Varieties of Polyanthus narcissus *(Narcissus Tazetta)* are best suited for the purpose. Available varieties are 'Paper White', 'Grand Soleil d'Or', and orientalis, the last named often sold as the Chinese sacred lily. None of these need freezing or keeping at very low temperatures at any time; they do require cool conditions during their early stages of growth. A temperature range

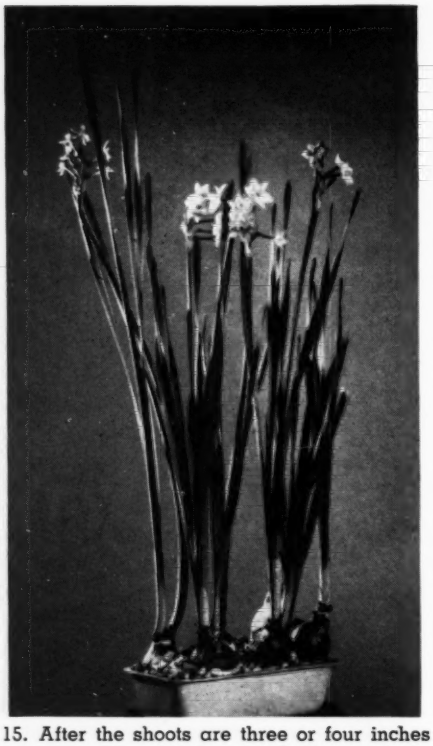
11. On a bed of pearl chips or pebbles in the bottom of a waterproof container bulbs of narcissus 'Paper-White' are stood.

12. Between the bulbs, which are placed closely together, more chips or pebbles are poured.

13. When planting is completed, the container is filled with water and put in a fairly cool place.



14. In their early stages the bulbs may be kept either in darkness or light. They soon develop roots and shoots.



15. After the shoots are three or four inches high, the container of bulbs must be removed to a sunny location. Flowers develop in a few weeks.

of forty to fifty degrees is best until a good mass of roots has developed and the shoots are three to four inches high; after that temperatures of fifty to sixty degrees are permissible. It is not necessary to start these bulbs in the dark, but if it is done, it is important to remove them into a sunny place when the shoots are well started. The bulbs are set closely together in the container with their bases resting on a bed of pebbles, more pebbles are filled around them, and the container is filled and is kept filled with water. After blooming is through, the bulbs are discarded; they are of no further use for blooming again.

GARDEN TECHNIQUES

Separates are available of the articles in the series on garden techniques by T. H. Everett, being published in The Garden Journal: Lawn Verges; How to Force Dutch Bulbs; Some Sources of Humus; Tree Pruning Pointers; Sowing Seeds in Flats; How to Transplant; Some Fall Gardening Work; ten cents per reprint, any six reprints 50c.

Write for special prices on quantity lots for garden clubs, horticultural societies, institution, etc.

The New York Botanical Garden
Bronx Park New York 58, N. Y.

"Any Other Type, Any Other Color"

By **Mary F. Capreal**

EVERY YEAR, it is the same way. We nod at one another in solemn agreement—we are not competitive people. We do not care who has a better mousetrap (personal synonym for anything desirable, owned by others) than we have. There isn't a flower invented that we couldn't grow better when conditions are ideal. We know that, so we relax in our confidence.

It is March when we look over the new varieties of chrysanthemums offered. I think we should try some new ones each year. I take on the self-imposed task of selecting. It isn't made any easier with Cap coming in and saying, "Don't buy any new ones. We haven't room for those we have now. Just let's grow the ones we have, properly." I agree with mine adversary quickly and go on reading about "Tremendous creamy white . . . . . Outstanding, $2.00," and turn to "British import, purest white . . . . Extraordinary $.50," which invites the cynical reflection that the ratio between something "outstanding," and something "extraordinary," is one to four. The check goes out for "outstanding," "extraordinary," "valuable exhibition," and "welcome addition," and all I have to do now is to watch the mail box and get them planted in among the hold-overs from last year before Cap discovers we now have one hundred and forty-four varieties instead of ninety-five. I just can't stand to hear him groan.

New cuttings are rooted and the plants reach the setting-out stage and my duplicity is discovered. Being an orderly person, Cap has noted on paper the width of each flower bed and the number of plants that can be planted in each. To find room for sixty or more plants is just too much for him to contemplate, and he takes refuge in his favorite escape and in a few minutes his audible sleeping is heard from the living room.

The problem is strictly up to me now. I've had in mind all along that indispensable invention of the greedy gardener, the "flower bed stretcher." It seems never to occur to a husband that flowers will grow anywhere except the street, and there are some weeds that do a creditable job of just that. All it takes is just another foot of width on every bed and look at all the room you have and there is less grass to mow.

The summer advances. The shading cloth goes on at night and off in the morning, inexorably, for many weeks. It becomes very burdensome—the watering, the fertilizing, and the spraying. Suddenly, I see one of the "Outstandings," droop. I discover a borer has escaped the lethal dose. That was one of the ones I had contemplated entering in the fall flower show, but wait a minute—we don't care! Remember: "We are not competitive—we don't care who has a better mouse ———!"

But you find you do care. You spend time and money on it and have even allowed your mind to dwell dreamily on a blue ribbon. Oh well, that old catalogue, with its old adjectives. When it comes next year, you'll just toss it aside.

Flower show schedules will always be Sanskrit to me. No matter how carefully studied, I always enter something under the wrong class. Not being competitive people, we never grow specifically for classes. Since I have to do the selecting, I find that we usually have plenty to enter under "Any other type," and "Any other color." Never enough for a, b, c, etc., Section II.

We are asked to get our entries in the night before the flower show. That afternoon finds me mumbling hours on end, "Now let me see—is 'a' white, or is 'a' yellow?" Isn't it stupid to have to remember that "a" stands for yellow, or is it white? Wouldn't it be simpler just to name the colors but then (scathingly) that would be far less confusing and that wouldn't do at all. I have three perfect pink incurves, but the schedule wants 'em to be yellow. At this particular moment I hate the world.

In the meantime, Cap arrives home, dinner is not ready, and he tries to help. He grumbles and offers miles of

gratuitous advice about how silly it is to get all tired out and why do I want to enter anything anyhow, to which I have learned to close both ears. He reminds me, "You know we don't care if we never win. Flower shows aren't the be-all and end-all of our existence, as they are with some folks." I've already typed labels and am attaching them to the entries, while the lecture is going on. Cap spies a bunch of rejects, unworthy of competition, and then he really hits the ceiling. To his prejudiced eye, each one rates a blue. No amount of explaining that this spray has one broken bloom or that the foliage on the big yellow exhibition could be better, satisfies him and, of course, the man is hungry.

All at once, in one big whoosh, I'm tired. I chuck the few I've labeled into the car, kiss him "Goodbye," and as I pull away I think in sudden panic, "Did I put 'Welcome Addition,' under Section 1, (c) or is it a 'reflex'?"

The next afternoon I go over to the proving grounds to pick up his entries (for he has done most of the work) with my name on them. It is pleasurable to meet different friends and to look at the beautiful blooms and congratulate the winners and to be congratulated in turn, for out of twenty-three entries, we've picked up eighteen ribbons, some of which are blues!

After dozens of "see you next years," I start for home with warm memories of a pleasant autumn afternoon in my mind and what all I must remember to tell Cap.

He hears the car in the driveway and comes out to help. I begin, "Say, do you know whom I saw over there ———?" He interrupts, "Never mind whom you saw over there! *WHAT'D YOU WIN?*"

Every year, it seems, it's the same way.

ROSES (from page 150)

Another good rose (difficult, I know, for a cold climate) is 'Mermaid'—a really wonderful rose with glossy foliage, bronzy new shoots, and four-and-a half-inch silver flowers studded with orangy wine-colored stamens. With us (in Seattle, Wash.) it is magnificent, flowering without fail from May until December. If you want to grow 'Mermaid,' don't pamper it. The best 'Mermaid' I ever saw was one a friend of mine had thrown on a heap of rubbish, with weeds and stones, because it would never do anything for him. 'Mermaid' took over the rubbish heap, grew till she was about thirty feet across — an astonishing sight. 'Mermaid' sulks at first — that is why nurserymen don't like to sell it—and won't start new growth until late September. Let the little plant alone, just don't pamper it, and she will come along satisfactorily. If you need a hedge that is dog-proof and kid-proof, plant 'Mermaid.' Stretch wire between two by four posts set eight feet apart; start 'Mermaid,' and she will eventually cover forty feet. Her thorns are as sharp as fish hooks—and you can't get in to prune. This rose is also disease-free.

CALIFORNIA GARDENS (from page 147)

Pacific in front and below her. The garden is filled with native plants and also with choice bulbs from South Africa and elsewhere. Although Mrs. Rowntree is not well, her station wagon packed with her sleeping bag and sparse food supplies was standing ready to take off in a few days.

After leaving Carmel I drove through the San Joaquin Valley which I had long wanted to see. It is entirely flat and at one point is four hundred miles across and is the center of agricultural activity, all conducted with a perfection of skill. Here is situated the largest peach orchard in the world, also orchards of apricots, figs, grapes and here, too, even cotton and rice are raised.

There were only three days left for San Francisco so there was little time to visit gardens. But I went to the Golden Gate Park, which I had seen thirty years ago when it was much younger, and it was remarkable the way the planting had settled down and spread out.

I also visited Dr. Victor Reiter's garden, La Rochette, laid out in a series of terraces. It is a well-known nursery. Dr. Reiter, a whimsical person, is now teaching botany at Mills College and conducts the nursery more for fun than as a sole source of income. He is known for his fuchsias, which are superb and grow under arbors, and specially recommends the varieties 'Berkley,' 'Gay Senorita,' 'Afterglow,' 'Fanfare,' and *denticulata*. He has many other rare and lovely plants such as lavenders and brooms. One of these last, *Cytisus Beanii* is grafted on a laburnum. He told me *Cytisus kewensis* is a hybrid, which explains why I have never been able to have it come true when raised from seed.

There were many worthwhile private and botanical gardens I did not see on my short visit, but I hope to go again.

Native California Plants in
Mrs. Arthur D. Richardson's Garden

Ceanothus cyaneus, San Diego lilac, 6-12 feet
Ceanothus impressus, Santa Barbara lilac, 35 feet
Ceanothus megacarpus, buckthorn lilac
Ceanothus tomentosus, olivaceus, Ramona lilac, 4-8 feet
Ceanothus gloriosus, Point Reys lilac, prostrate
Ceanothus thyrsiflorus, griseus, Sea Cliff lilac
Fremontia californica, flannel bush
Fremontia mexicana, flannel bush
Photinia (Heteromeles) arbutifolia, California-holly or toyon
Quercus dumosa, California shrub oak
Umbellularia californica, California-bay or laurel
Carpenteria californica, with fragrance of mock orange, 3-7 feet
Arctostaphylos insularis, island manzanita
Arctostaphylos Uva-ursi, red bear-berry or sand-berry, 6 inches high
Rhus integrifolia, lemonade-berry or sour-berry to 30 feet high, flowers white or tinted pink
Rhus laurina, laurel sumac
Rhus ovata, sugar-bush
Ribes viburnifolium, Catalina currant, 2-3 feet high; has glossy dark green leaves, small pink flowers, and red stems; likes some shade—was planted under a holly tree at back of house on bank and near the statue of St. Francis
Salvia Clevelandii, Cleveland's blue sage
Salvia mellifera, black sage
Salvia apiana, white sage
Eriogonum giganteum, giant buckwheat, St. Catherine's lace
Eriogonum rubescens, red buckwheat
Eriogonum fasciculatum, wild buckwheat
Eriogonum saxatile var. *crocatum,* conejo buckwheat
Trichostema lanatum, woolly blue-curls, or Romero

The Editor Visits

"Winterthur"

The Empress tree (*Paulownia tomentosa*) frames this scene of thousands of narcissi sweeping across the meadow at "Winterthur"

For many years we'd talked about following the spring with azaleas, but for one reason or another had failed to do so. Finally, this past May, we did see azaleas in Delaware gardens, in the National Arboretum, and in the Allegheny Mountains and the Blue Ridge Mountains of Virginia. I should insert here that we saw azaleas blooming at their peak early mid-May, in advance of their usual period, at The New York Botanical Garden before we left on our trip.

Actually, with Nature's caprices sending temperatures soaring to the upper 80's the latter part of April and the fore part of May, forcing flowering cherries, dogwood, and lilacs into flower simultaneously at the Garden, we hardly knew what to expect elsewhere. But Nature's tricks were to our advantage—the warm weather which had rushed the season was followed by a cool spell which held things in check, and so we had the unique experience of an extended blooming period of plants which normally do not bloom together.

At "Winterthur" we were informed by George Jack, who is in charge of the greenhouses, that the azaleas had passed their prime the previous weekend. As we trod the tanbark paths through the extensive woodland plantings of azaleas and the turf path through the more open plantings, we could see evidence to substantiate Mr. Jack's comment—in one wooded area the ground was bright red with fallen petals—but there was still a great abundance of blooms varying from purest white through pastel yellows and pinks to flaming orange and many shades and tones of red.

"Winterthur," as doubtless most of the readers of The Garden Journal know, is the estate of Mr. and Mrs. Henry Francis du Pont in New Castle County, Delaware. Ever since Mr. du Pont assumed the management of "Winterthur" in 1914, twelve years before his father's death at which time the property passed to him, he has devoted himself to preserving the natural beauty of the land and to enhancing it with a marvelous collection of plants. While "Winterthur" has become famous for its azalea gardens, there are many other beautiful trees and shrubs. Every woodland tree or plant which grows in Delaware grows here. We were impressed with the towering tuliptrees and yellow locusts, the wealth of dogwoods and oaks, the magnificent conifers—including two of the finest specimens of *Cedrus atlantica glauca* we have seen anywhere, an imposing Japanese maple—reported to be the oldest and largest outside Japan, the fragrant Empress tree or paulownia bearing a heavy crop of pods, the crabs and cherries and magnolias, the mock-oranges, syringas, viburnums, cotoneasters, and hollies, and were greatly interested in the planting of Saunders' hybrid peonies. We were delighted to find the

Visitors stroll along a tanbark path through plantings of Kurume azaleas at "Winterthur"

Path lined with *Azalea (Rhododendron) ledifolia alba* winds through the great planting of conifers in the gardens of Mr. and Mrs. Henry Francis du Pont at Wilmington, Delaware.

woodland carpeted with wild flowers—trilliums, anemones, Jack-in-the-pulpit, star-of-Bethlehem, Brandywine bluebells, spring-beauty, and small bulbs.

Forty years ago, Mr. du Pont chose with great care sixteen azalea plants and with these sixteen plants as a nucleus began to develop the azelea collection that includes such types as Kaempferi hybrids, *ledifolia alba, caroliniana, mucronulatum,* Ghent and mollis hybrids, Kurume hybrids, *Schlippenbachii*—all in wide variety. *Mucronulatum magnificum* "Winterthur," which frames the statues of George and Martha Washington, still carried many of its mauve blooms on the day of our visit, and the blooms of *ledifolia alba* glistened in their purity against the various greens of the different conifers.

Did the Editor and her husband take in the Henry Francis du Pont Winterthur Museum? Yes, with trained guides and hostesses to impart information about the furnishings, we enjoyed the opportunity of viewing the twenty rooms which, together with Mr. du Pont's gardens, are open without advance reservations each spring, the last week of April and the first four weeks of May, except Sundays and holidays.

The furniture, textiles, ceramics, silver and pewter, paintings and prints represent the richest collection of American decorative arts from 1640-1840 and occupy about one hundred rooms.

A full-day tour can be arranged, or an afternoon tour and a morning tour the following day, at times other than during the Museum-Garden Tour, by writing to the Reservations Office; by such appointment one can view all the rooms.

Naturally, certain of the rooms appealed more to us than others—tastes differ; it would be a monotonous world if all tastes were alike. We liked and lingered in the Port Royal Entrance Hall and Parlor from the country home which Edward Stiles, a prosperous planter and merchant of Port Royal, Bermuda, built in 1762 on Frankford Creek, north of Philadelphia; the Du Pont Dining Room, decorated in the neo-classic style and with the four tall windows hung with the handsomest fabrics of the "Winterthur" collection; the Morattico Hall—the woodwork in this room was taken from a home built in 1715 in Richmond County, Virginia, and the furniture and decorative arts illustrate the colonists' adaptation of English and Continental styles to their New World homes; and the Flock Room from Morattico Hall, with its rich wall fabrics, its paneled fireplace, the heavy maple and oak table in the center of the room. But we lingered longest in the Marlboro Room and in the Montmorenci Stair Hall. We were held spellbound by the graceful design and

The Port Royal Parlor, from "Frankford," near Philadelphia, built in 1762, is one of the rooms in the Henry Francis du Pont Winterthur Museum. The room is furnished with fine Philadelphia Chippendale furniture, Kuba rugs, and yellow silk damask curtains and furniture coverings. The chandeliers and wall lights are English cut glass, about 1775.

proportions of the spiral stair case, the artfulness of its structure which is without visible support as it rises in an elliptical curve—the support comes from the balance of the bottom and top steps which form a perfect circle. We also enjoyed the Fraktur Room, which illustrates the work of the Pennsylvania-German craftsmen.

The Henry Francis du Pont Museum is so much more than a museum—it has a warmth, an atmosphere of intimacy, it reveals how earlier Americans lived, what remarkable artists and cabinet makers and craftsmen they were, their talent in creating home furnishings, that were beautiful and functional. Americans of today are greatly indebted to Mr. du Pont for assembling this picture of this former American period and for making it come alive for them.

Peirce House, built in 1730, is on the right; the addition, built in 1914, temporarily accommodates the library of Longwood Foundation, Inc.

"Longwood Gardens"

"Longwood Gardens," located near Kennett Square in Chester County, Pennsylvania, was the estate of Mr. Henry F. du Pont's cousin, the late Pierre S. du Pont, who acquired the property in 1906 and developed it into one of America's show places. Mr. du Pont was generous in sharing the floral displays in his well known gardens and conservatories with the public. They have been open daily the year round without charge since 1931, and in 1937 he created Longwood Foundation, Inc., which is entrusted with the care and future improvement of this permanent public institution.

It has an interesting background, for "Peirce's Park," as it was first known, was a contemporary of "Mount Vernon" and "Monticello." William Penn conveyed the original tract of land to George Peirce in 1702. The old mansion, built by his son in 1730, still exists in good repair; it was added to and lived in many years. An addition built by Mr. du Pont in 1914 now accommodates temporarily the library of Longwood Foundation, Inc. Thirty people are employed there.

I have a personal interest in "Longwood Gardens," for my father, the late Martin C. Ebel, assisted Mr. du Pont in obtaining from Holland the original plants for his indoor azalea collection. My father introduced the late John T. Scheepers of New York City and the late J. Dykuis of Boskoop, Holland, to Mr. du Pont and helped to disentangle the complications in importing plants at that time, arising from Plant Quarantine #37. And John H. Marx, who conducted our tour of the extensive gardens, was recommended to Mr. du Pont in 1921 as greenhouse foreman by my father; he is now superintendent at "Longwood Gardens."

There is a series of gardens, of formal and disciplined aspect—the magnificent fountain gardens by the conservatory, the restrained yet elegant plantings of box, yew, spruce, hemlock, pine, and rhododendron; the sunken flower garden; the sundial garden; the

Italian water garden, copied from the Villa Gamberaia near Florence, Italy.

rose garden; the water garden copied from the Villa Gamberaia near Florence, Italy, with its blue tiled pools edged with English ivy, its unique fountain heads, and row of European linden along each side. The last garden always made a deep impression on us —it did so again. It leaves one with a feeling of dignity and repose, of time never ending.

It was thrilling to review the gardens with which we were familiar and to see the great outdoor theater in which concerts and plays are given from the middle of May through the middle of September by various organizations to raise funds for charitable causes. At the end of a performance a water screen, illuminated with colored lights, is created by the playing of the fountains —truly a "midsummer night's dream." Large Kentucky coffee trees, paulownias, magnolias, yews, and box furnish a backdrop for the theater. We also took note of the tropical water garden under construction and to be planted the week after our visit under the supervision of George H. Pring, Superintendent at the Missouri Botanical Garden.

After we had traversed the formal gardens and wooded area and along the small lake on whose margins thousands of narcissi bloom in the spring, we were joined by Dr. Russell J. Seibert, Director, on our tour of the conservatories. The range of glasshouses covers one hundred and fifty thousand square feet, over three acres, and has no dull season. There is bloom twelve months of the year—a staff of twenty-five expert gardeners accomplishes this feat.

The main display conservatory and the auditorium were aglow with the vivid colors of hydrangeas, Lady Washington geraniums and pelargoniums, the delicate colors of cup-and-saucer and peach-leaf bellflowers, the white and blues of delphiniums and lupines, the white and pinks of foxgloves, the white and yellow of marguerites, the pinks and lavenders and purplish reds of fuchsias. We commented that depending on one's mood one could, by merely turning his head and directing his gaze, feast his eyes on a spot of bright color or one of a subtle combination of soft colors.

When the large tree ferns are removed, the auditorium seats eight hundred. We sat there on two occasions—to witness the presentation of the gold medal of the National Association of Gardeners to Mr. du Pont in 1929, and to listen to the playing of the pipe organ, one of the largest ever built. Above the stage were profusely flowered bougainvilleas; on it stood two baskets, on standards, of lobelias—most appealing mounds of dainty blue flowers. We were, by the way, tremendously impressed with the hanging baskets throughout the corridors of the conservatories. Filled with browallias, or a weeping form of lantana, or fuchsias, or begonias, they were an effective decoration.

Another well-flowered bougainvillea covered the back wall in the rose house. The roses are planted in brick-edged beds on different elevations. Standing at the lowest level and looking upward at the top shelf, as it were, we saw pots of chenille plant and large pots of superb datura, bearing huge trumpet-shaped flowers. Dr. Seibert called our attention to one with apricot-tipped flowers, *Datura Mollis*. Mr. Marx remarked that he gets "six crops of datura flowers annually."

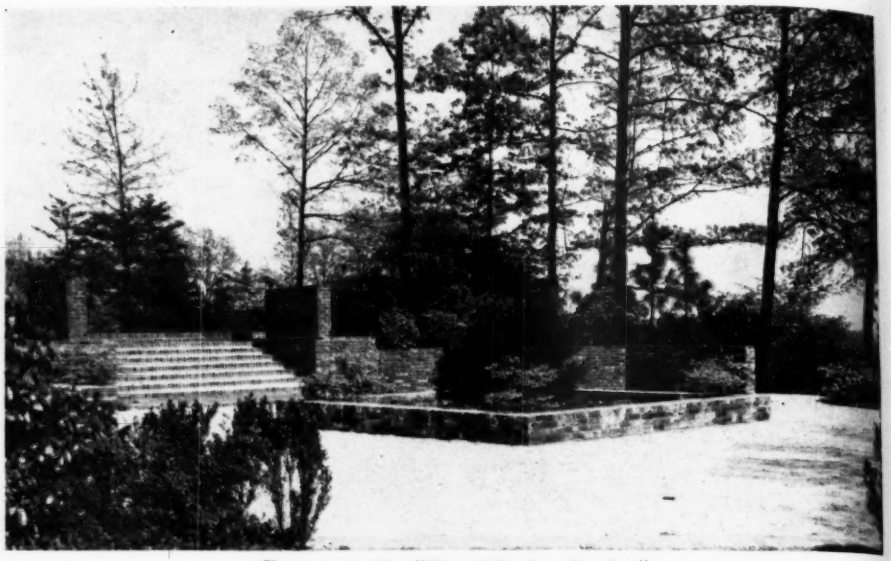
It is, of course, impossible to record all the plants we saw, all the interesting comments Dr. Seibert and Mr. Marx made as we walked through the conservatories—that the public loves the tropical house with coffee, papaya, vanilla, and tall banana trees bearing large bunches of fruit; that "Long-

Upper: The fountain garden contains huge specimens of English box; the conservatory is in the background.

Lower. Azaleas and rhododendrons bloom in the large azalea house during April and May.

wood" is interested in *Columnea,* a tropical American genus belonging to Gesneriaceae, and has twelve species in its collection—several making attractive basket plants; that a new house is being added for tropical orchid species, pitcher plants, and palms; that practical experiments are being conducted on high pressure mist, humidity, different intensity and length-periods of light.

"Longwood . . . . . is more than a garden, it is a center of culture. Its founder had a love of all the arts and a passion for horticulture, architecture, music, and drama. At Longwood . . . . . he concentrated his artistic enthusiasms into a harmonious ensemble." Fortunate indeed is the public who has enjoyed all its fabulous beauty for thirty-six years and will continue to do so in the future through the generous provisions stipulated by Mr. du Pont in his will.



Entrance to the "Clonal Azalea Garden"

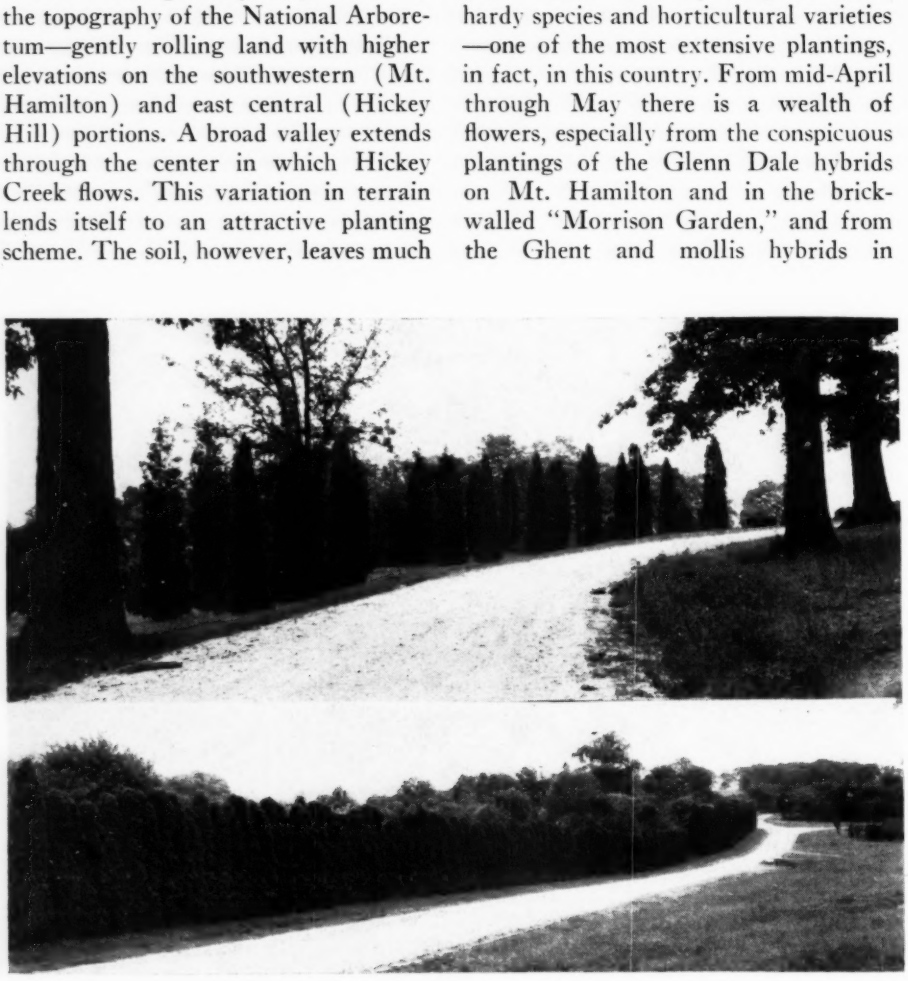
The National Arboretum

We were agreeably surprised with the topography of the National Arboretum—gently rolling land with higher elevations on the southwestern (Mt. Hamilton) and east central (Hickey Hill) portions. A broad valley extends through the center in which Hickey Creek flows. This variation in terrain lends itself to an attractive planting scheme. The soil, however, leaves much to be desired. Dr. Henry T. Skinner, the Director, explained some of the problems encountered, especially in the areas where the soil is a heavy clay, as he guided us around the grounds.

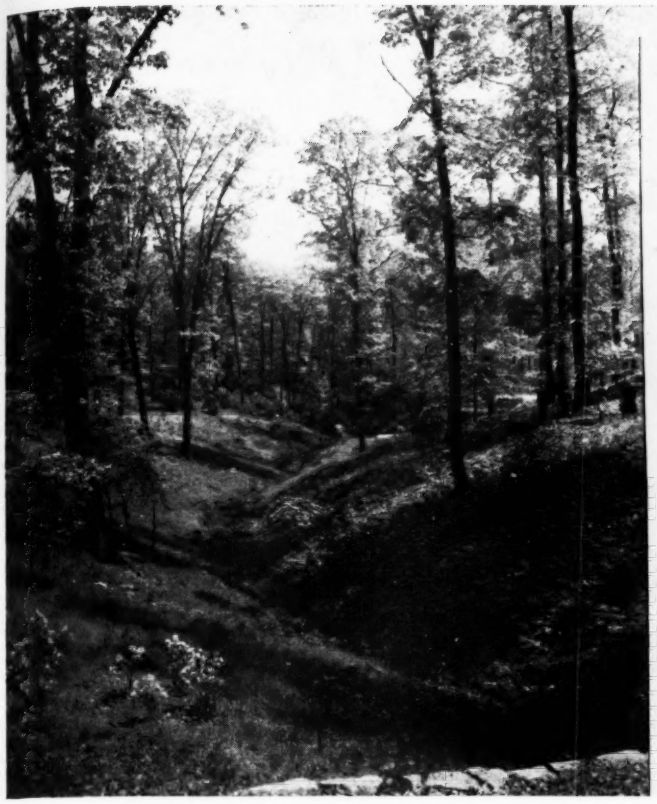
Azaleas comprised one of the important groups at the Arboretum, which has a relatively complete set of hardy species and horticultural varieties —one of the most extensive plantings, in fact, in this country. From mid-April through May there is a wealth of flowers, especially from the conspicuous plantings of the Glenn Dale hybrids on Mt. Hamilton and in the brick-walled "Morrison Garden," and from the Ghent and mollis hybrids in "Azalea Valley" and in other scattered plantings. There are also many other azaleas, including Kurume and Kaempferi hybrids and the closely related Gable hybrids, about sixteen American species with their variants and hybrids, and some Chinese and Japanese species, such as *R. luteum, Mariesii, ovatum, reticulatum,* and *Schlippenbachii.* Dr. Skinner's own azaleas, on which he began to work while at the Morris Arboretum and has continued to do so at the National Arboretum, are being planted out. He is particularly interested in the problem of hardiness and in native azaleas and made an extensive collecting trip several years ago in search of the latter.

The Glenn Dale hybrids were bred by B. Y. Morrison, the former director of the National Arboretum, while as head of the Division of Plant Introduction he was responsible for the Glenn Dale Station of the U.S.D.A. A complete set of his named Glenn Dale hybrids is assembled for comparison in the "Morrison Garden," where the plants are being studied for length of flowering period, color of flower and foliage, hardiness, and so on.

Rhododendron catawba hybrids and twenty of the hardy *R. Smirnowii-catawbiense* hybrids raised in Germany are planted in the upper section of "Azalea Valley," and a recent planting has been made of one hundred and fifty standard and newer hybrids in the



Upper: Chinese junipers along driveway in National Arboretum
Lower: Arborvitae makes a good windbreak



Left: "Azalea Valley," National Arboretum

Right: Ghent and Mollis hybrid azaleas

lower end of "Azalea Valley"—a gift of the Capital Committee of the Garden Club of America.

Blocks of azaleas are being planted by color for color comparison—to determine which may be the better whites, pinks, yellows, orange, reds. Azaleas are also planted with other shrubs and trees for landscape effects.

The Arboretum has fine specimens of *Cedrus atlantica* and *libani,* of *Cryptomeria japonica,* of river birch, black walnut, sweet-gum, and of the black, white, and beautiful willow oaks. Twelve native species of oak are to be seen at the Arboretum.

There are plantings of hollies, crabapples, dogwoods, magnolias, and a number of conifers. We were particularly impressed by the splendid examples of dawn cypress, *Metasequoia glyptostroboides*—healthy, well-shaped trees up to twenty-five feet tall. Four hundred of them, Dr. Skinner told us, were planted here from the seeds distributed by the late Dr. E. D. Merrill when he was director of the Arnold Arboretum.

Within sight of the entrance is a thirty-acre "synoptic" garden in which, when complete, will be assembled representatives of all the Arboretum plantings—a worthy undertaking.

In the greenhouses the benches are filled with seedlings and cuttings—clean and thriving, evidence of careful attention—of a wide variety of plant material, for considerable work in hybridizing is carried on. Holly crosses are being made in an effort to secure a tree with the hardiness of *Ilex opaca* and the glossy foliage of *I. aquifolium.* Many such crosses have been made in the past without the hoped-for results; so far *I. opaca* has been the dominant parent. Crosses are now being tried between species and hybrids to introduce "new blood." The Arboretum is working on hardier forms of *Camellia sasanqua,* on hardier forms of some of the evergreen species of *Viburnum,* and on *Eucalyptus* species from the coldest section of Tasmania with the idea of getting at least one that could be grown outdoors in eastern United States.

Experiments are being conducted in the greenhouse on the effects of different periods of light and varying intensity—in one instance, to secure abnormally vigorous shoot growth on mist-rooted cuttings of deciduous azaleas.

The National Arboretum is still in the throes of development—new roads are being constructed which necessitate changes in planting, there are areas which have not been planted, library and herbarium facilities are needed. It will probably be years before the Arboretum, established by Act of Congress on March 4, 1927, and administered by the Research Service of the U.S.D.A., is complete — government appropriations being what they are and operations having been interrupted by wars—but anyone who is concerned with woody plants will find much to interest him at the National Arboretum. We're planning to go again—the next time in late April.

(To be Continued)

Hybrid involving *Rhododendron arborescens* and *R. atlanticum*—an early step towards producing a new race of hardy deciduous azaleas which can also be grown from cuttings.

CHRYSANTHEMUM CULTURE (from page 155)
interest to gardeners is how to maintain soil fertility and make available to the plant its nutrient requirements. The most important factors are water, air, and carbon. To them we can add soil pH, temperature, organic matter, and a number of soil organisms as other factors which control (increase or decrease) the availability of the plant nutrients.

First, let us briefly review what these internal requirements are and the part they play in the metabolism of the plant.

WATER: Water is necessary to all living things. Vascular plants probably contain some ninety per cent or so of water. Water is a solute and a carrier of nutrients to the particular parts of the plant. It plays an important part in the chemical changes and metabolism within the plant. It controls the condition of turgor in the plant structure. Water is absorbed through the root system by osmatic pressure in transpiration and metabolic respiration.

CARBON: A very important element in the biological processes of plant growth, carbon is the source of energy (sugars and starch), synthesized in the leaves of plants by the process known as photosynthesis. Most of the carbon is obtained from the atmosphere in the form of carbon-dioxode.

OXYGEN: An essential element in plant metabolism and respiration, oxygen is involved in the release of energy. It is obtained mostly from the air in photosynthesis.

HYDROGEN: Important in protoplasm and oxidation, hydrogen is obtained from the soil solution.

The above three elements, with water, comprise the bulk of the plant structure—probably ninety-five per cent more or less. These elements are variable but not critical unless there is disease, cold temperatures, and too little, or too much water.

Eleven other elements are critical for plant growth. Too much, or too little of these critical elements can cause serious conditions. In recent years, studies in plant physiology indicate that a proper balance of these eleven nutrient elements will produce more effective growth condition in plants. Other studies in plant physiology within the past generation have been on growth substances synthesized within plants. When determinations are completed in these studies, we may well have new chemicals and new ideas on how to feed our plants.

These eleven elements are generally divided as major and trace elements.

MAJOR ELEMENTS:

NITROGEN (N): An essential constituent of all living organism, an important part of protein and amino acids in plants. Nitrogen is taken up by plants with the soil solution in a soluble form as nitrate nitrogen (NO_3) ions and some in the ammonium form (NH_4) ions. Deficiencies will limit growth and affect chlorophyll content in leaves.

PHOSPHORUS (P): An important factor in plant metabolism and growth, phosphorus is connected with growing tips in plants and flowers. Deficiencies will retard or stop growing tips. Reduction in phosphorus will also release soluble nitrogen in the plant to produce dark green leaves.

POTASSIUM (K): Found mostly in the fast growing parts such as root tips, aerial growing tips, and under the bark of the plant structure, potassium is involved in bio-chemical processes, photosynthesis, and starch assimilation. Deficiencies will retard root growth or injure roots, and will also cause marginal leaf burns, spreading until the leaf dies. Too much potassium can be even more serious than too little—roots can be injured and chlorosis of leaves can result.

CALCIUM (CA): This element has an important part in the biological processes within the plant. It acts as a stabilizer for nitrogen and is involved in the availability of a number of other nutrients. Calcium is also used to regulate soil pH upward. Deficiencies produce necrosis of buds and leaf distortion.

MAGNESIUM (MG): A necessary requirement in chlorophyll formation, magnesium takes part in plant metabolism. Deficiencies will produce chlorosis or necrosis in leaves.

SULFUR (S): It is involved in the protoplasm for the production of amino acids, cells and flowers. Deficiencies are rare, but can cause some chlorosis in the leaves.

TRACE ELEMENTS:

IRON (FE): It appears to be needed in chlorophyll production but not as a constituent of chlorophyll. It is involved with some enzymes. Deficiencies will cause chlorosis in leaves. Underdeveloped roots or root injuries can also cause deficiencies. Unaerated soil and high pH reduce iron availability.

MANGANESE (MN): Involved in plant metabolism, in some enzymes, iron availability and chlorophyll production. Deficiencies cause chlorosis.

COPPER (CU): Involved in oxidation with some enzymes. Deficiencies will cause leaves to wilt and die, regardless of water content. Copper and manganese (above) are similar in action and availability in the soil to that of iron.

ZINC (ZN): Involved in enzymic processes, in the production of some growth hormones in plants. Deficiencies will retard or prevent plant growth and give the appearance of a diseased condition, with yellow and deformed leaves. Its action and availability in the soil are similar to iron.

BORON (B): Its part in plant metabolism is not too well understood, but deficiencies do appear to retard or kill growing points, such as root and stem tips.

It may be well to offer a word of warning on the above trace elements. They are critical in plant growth but too much can be more harmful than too little.

Soils with mineral and organic content, generally contain considerable amounts of these trace elements in a complex form and are made available gradually to plants by oxidation and bacterial activity. Several acids that form in these processes, act as a solvent to dissolve these elements.

Cold temperatures, high soil pH, and the lack of air can retard or prevent availability of trace elements.

It is not likely that the average soil is lacking in trace elements, but it is advisable to check with your local farm bureau or state experiment station.

Deficiencies in trace elements may and do sometimes occur. Be sure—before applications are made to remedy the condition—because the deficiencies may be caused by other soil conditions.

To amend trace element deficiencies, the sulphate forms for iron, manganese, copper and zinc are the best; for boron deficiency, sodium borate (borax) is good. These chemicals are all soluble. Care should be taken when applica-

tions are required. One or two tablespoonful, dissolved in water and sprinkled over one hundred square feet of soil area, is sufficient. Additional watering will hasten its action.

The question may arise at this point on how to determine or recognize signs of nutrient deficiencies in plant growth? The terms "chlorosis" and "necrotic" are used to define some general conditions that result from nutrient deficiencies, such as yellowing of leaves, brown spots that spread, marginal burns, deformity of leaves, and so forth that continue to spread and eventually kill the leaves, or severely affect their functions. It would be simpler to recognize adverse conditions caused by nutrient deficiencies, if the causes were from only one source. There are a number of conditions, sometimes in combination, that appear similar to nutrient deficiency. The specialist who follows developments under controlled conditions can make a pretty good appraisal of the trouble but in outdoor plantings, the problem of diagnosis is more difficult, for the planting areas are open to the ravages of nature. It would take the facilities of a laboratory for the correct answer.

Probably the best advice under these conditions would be (1) review your soil condition, fertility program, and spraying program to see if something essential has been neglected. (2) If the trouble appears to be in the soil, remedy it if possible. Soil pH is very important. Pulverized limestone will raise the pH and sulphur will lower the pH. Both are somewhat slow in action but may carry plants through the season, improving the soil with time. (3) Soil aeration is important. It can readily reduce nutrient availability. (4) Do not be too hasty in applying additional nutrients. There may be enough with favorable soil conditions. (5) If it is a soil-borne disease, it will probably spread and the best thing is to pull the plants out, pick up all leaves around them and burn them. After all the plants are out, soil sterilization should be undertaken. When temperatures are warming up in late spring or early summer is a good time to sterilize. (6) If conditions go from bad to worse, send samples of soil and plants to your state research station for analysis.

To be Continued

BOOK REVIEWS

LIBERTY HYDE BAILEY. Philip Dorf. 259 pages, indexed. Cornell University Press, Ithaca, N.Y. 1956. $3.50

It is helpful but not essential, the author remarks, for a biographer to know his subject personally; Mr. Dorf proceeds to prove his point by presenting a most interesting account of this great life which he knows only from the subject's writings, from the recollections of others, and from similar, indirect sources. This is not, nor is it intended to be, a complete, definitive treatment of the subject; but it is an especially readable one for those who enjoy getting to know the men and women who have left behind great contributions to human society. This is more an account of the personality and human-ness of Bailey, the man, than an eulogy on his many claims to fame.

The story takes up with the birth of Dr. Bailey and his early years in the frontier community of northern Michigan, takes him through his youthful years and his struggles for an education, through his years as a teacher at Michigan Agricultural College and Cornell University, through his ten years as dean of Cornell's Agricultural College (which came into existence almost entirely through the efforts of Bailey), and finally through the many active years which followed his official retirement. He is perhaps best known as the dean of American horticulture but nearly as important were his battles, legislative and otherwise, to improve the educational and social life of rural America.

Bailey's ninety-six years were so crammed full of living that a small book like this can hardly be expected to more than scratch the surface of Baileyana, but in its restricted scope it is quite well done. As the writer observes, "he had lived a full and useful life. However, to complicate matters for biographers, he then proceeded to live another full and useful life—thirty-six working years—until overtaken not by age but by an accident."

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U.S. National Museum
Smithsonian Institution

EDWARD PALMER. PLANT EXPLORER OF THE AMERICAN WEST. Rogers McVaugh. 430 pages, illustrated, indexed. University of Oklahoma Press, Norman. 1956. $6

The name of Edward Palmer is familiar to all botanists who deal with plants of Mexico and western United States, but most of us know little more about the man than that it is apt to be difficult to determine just where his specimens were collected. Dr. McVaugh has done all that can be done toward helping us to know and understand Palmer the man, and toward clarifying the geographic origins of his specimens. Fully half the book is devoted to an annotated catalogue of the localities that appear on Palmer labels. One learns that the scantiness of the data is not wholly Palmer's fault. The original field books, some of which are still preserved, contain quite a lot of additional information that the eminent botanists who supported his work did not bother to include on the labels.

Palmer emerges from this study as a man of tireless industry and unquestioning self-confidence, but without great native ability and wholly unable to understand or successfully deal with other people. Dr. McVaugh is to be congratulated for a fine job of bibliographic research, a critical interpretation, and a readable presentation.

ARTHUR CRONQUIST

NATURE'S GUARDIANS. YOUR CAREER IN CONSERVATION. Harry Edward Neal. 192 pages, illustrated, indexed. Julian Messner, Inc., New York. 1956. $3.50

NATURE'S GUARDIANS, while a conservation book, is not about conservation, but rather about the jobs of those who work professionally at guarding and at maintaining our basic natural resources. While a book that covers a broad field, it has, of necessity, had to be limited to a few basic organizations. For that reason, most of the space is devoted to the jobs of those employed in wildlife or fisheries work by the U. S. Fish and Wildlife Service, those engaged in forestry in the U. S. Forest Service, and some work in the Soil Conservation Service.

In the wildlife field, there are many more jobs in the state agencies than in the one federal agency which is covered in some detail. However, the character of the work and the type of jobs are much the same as those that are outlined.

The book is well, and sometimes excitingly, written. While a large part of it is devoted to outlining the kind of employment that is available, it is often done by the device of discussing a particular program or experience of a person or a group of persons.

The titles and contents of some of the chapters give a vivid idea of the kinds of work available. The chapter on "Fact Fishermen" is devoted largely to the work of the biologists in the Fish and Wildlife Service. It gives graphic accounts of some of the work and the problems faced in finding answers to management problems. "The Fishing Business" applies in the same way to those who work in the commercial fisheries field, either as fact-finders or as operators of experimental equipment.

"The Fur of the Future" features, of course, the spectacular operations with the fur seals on the Pribilof Islands, but it does not overlook the opportunities for employment in the United States, either in fur farming or in wild fur businesses.

"The Game is Up—and Down" deals with employment in the wildlife field, in law enforcement, in wildlife management, in the development and maintenance of refuges, and in biological research. As one would expect, refuge activities covering the entire United States are featured.

This and other chapters not only outline the subject matter of the work, but discuss the types of positions that are available in each category and in others. The same can be said of the chapters covering forestry and soil conservation, although they are not as detailed as those covering the Fish and Wildlife Service.

Throughout the book there is constant reference to the fact that there are many state agencies doing this same type of work and that the state fish and game depart-

ments have more positions available than does the Fish and Wildlife Service. There is appended a list of the state fish and game departments, as well as numerous private conservation organizations which employ personnel.

All in all, this is an excellent book and one that should be in the hands of everyone who is contemplating a career in the wildlife field. As the author so aptly says, "If you are considering a career in conservation, you need more than a natural liking for fishing, hunting, and camping." This book points out the problems, the kinds of jobs, and very frequently the hardships and tribulations which men must undergo if they are to carry on successfully in this field. He is absolutely right in pointing out that a keen interest in helping to maintain the resources is an essential ingredient for a successful career in the field.

The book is well illustrated with photographs and it should be a "must" for anyone who is planning to get into the field.

IRA N. GABRIELSON
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Washington, D. C.

THE STRUCTURE OF WOOD. F. W. Jane. 427 pages, illustrated, indexed. Macmillan, New York. 1956. (Printed in Great Britain.) $9.50

Professor Jane's book is indeed a welcome addition to the textbook-poor world of wood anatomy. Written for students both in wood technology and botany, THE STRUCTURE OF WOOD does not purport to be a comprehensive treatise on the subject. Nevertheless, most of the important topics have been considered. Beginning with an elementary discussion of how plants are named, the author presents a "classified list" of genera producing commercially important timbers. Several chapters on the structure of the stem follow, in which are pointed up for consideration, the trunk of the living tree, the gross structure of wood, and the micro-structure of coniferous and dicotyledonous wood. A brief discussion of anomalous woods is included as well as a chapter on "The ultimate structure of wood" by Dr. K. Wilson of the University of London. Other subjects considered in this section are: variability in wood, abnormal wood, diseased wood, figure in wood, and the properties and uses of wood in relation to its structure. Most of the remainder of the volume, 114 pages, is devoted to the identification of timber. An appendix describing some microtechnical procedures is followed by a bibliography and index.

Professor Jane is to be congratulated for his non-sectarian approach, for the woods of the world are used as examples in this book. The chapter on "atypical" trees and timbers is, I believe, uniqe among in-print wood anatomy books in the English language. The discussion by Dr. Wilson of the sub-microscopic structure of wood is orderly, clear, and uncluttered with an excess of technical terminology. The author's insight into the qualitative and quantitative variability in wood, is refreshing, for too many wood anatomists and technologists treat wood as an unvarying substance. The introduction to the section on wood identification is especially noteworthy, for summed up here are the many techniques which can be employed in the determination of an unknown sample of wood, as well as a discussion of the standard nomenclature employed in the description of woods. The chapters on the actual identification of wood are, however, likely to be a bit impractical for this purpose. For instance, there is no master key to all the woods considered in this section. Chapters are devoted to particular groups of woods, e.g., common hardwoods, common softwoods, woods with the common designations of teak, mahogany, and walnut. However, it should be stated that within these categories, the author presents useful characters for distinguishing among the timbers. The chapter on technique, though brief, will acquaint the novice with some of the various methods in the preparation and examination of wood. One might question the inclusion of such a chapter, however, when there are several good texts on plant micro-technique which do consider methods for woods and woody plants.

In perusing Professor Jane's text, several features seem worthy of consideration for future editions: the inclusion of subheadings within chapters, the technical improvement of some of the photomicrographs (e.g., figures 49, 53B, 54C, 56, 57B, 59E, etc.), and a more satisfactory arrangement of these on the page so as not to leave large amounts of distracting white space; and some consideration of the phylogenetic value of wood anatomy. Although the phloem is discussed in the text, the illustrative material is sparse and of poor quality. This is also true for the vascular cambium and the shoot apex.

THE STRUCTURE OF WOOD is the most up-to-date textual presentation on this subject. It is interestingly written and accurately presented. There is no question that it deserves a place on the shelves of libraries in the biological sciences, as well as among the personal books of plant anatomists and morphologists, and wood technologists.

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DISEASES OF FRUIT CROPS. Harry Warren Anderson. 501 pages, illustrated, indexed. McGraw-Hill Book Co., New York. 1956. $8.50

At long last we have an up-to-date book on the DISEASES OF FRUIT CROPS. I make this statement with one reservation in mind —namely, it is a very difficult matter to be exactly up-to-date or up-to-the-minute in anything—even to the writing and assembling of a scientific book such as this.

Professor Harry W. Anderson has done a credible job in preparation and writing of this textbook on diseases attacking the principle fruits grown in the north temperate zones of the United States and Canada.

I have actually taken the time to go through this book—for me it was almost like reading a novel. It held my interest. Professor Anderson has that knack of presenting research material, together with other historical references, in very interesting story-like way. As a rule, textbooks as scientific as DISEASES OF FRUIT CROPS tend to be rather trite or very scholarly.

This scientific book covers thoroughly all the principal diseases attacking fruits whether they are caused by bacteria, fungi, viruses, or non-parasitic agents. With very adequate photos and drawings as well as good descriptive text, Prof. Anderson—a teacher all the way—gives the student a word picture of the diseases.

I could go on and on, but I have been warned that I must be brief. Therefore in the final analysis, I can say, as a County Agricultural Agent with many years of experience in horticultural matters, diseases and insect control on all the crops specified in this book, that not only will this book be used extensively as a textbook in colleges, it will, in time, find its way to the book shelves of county agents interested in fruit growing. It also has a place in the library of the research horticulturists and pathologists. This book, however, is too broad in its scope to be of much use to the average gardener or home fruit grower.

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CHRISTMAS TREES FOR PLEASURE AND PROFIT. A. G. Chapman and R. D. Wray. 215 pages, illustrated (sketches by Helen C. Schober); indexed. Rutgers University Press, New Brunswick, N. J. 1957. $3.75

This is a timely little book, since the growing of Christmas trees is becoming such an important business.

The authors have a broad knowledge of their subject and present it in simple non-technical language. Every phase of operation is covered from the selecting of suitable land, through the best species to grow, planting and management of plantations, harvesting methods, marketing, and how to figure profits and taxes.

The reader will find the long list of suggested literature in the back of the book helpful, if he wishes to pursue his study further, and the beginner will welcome the many fine photographs and line drawings found throughout the book.

(Continued on page 175)

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NEWS, NOTES and COMMENTS

Reception for graduates at The Garden. Twenty-one students received certificates on the evening of June 20, 1957, having satisfactorily completed two years' study at The New York Botanical Garden. Dr. L. O. Kunkel, member of the Board of Managers, presented certificates for the Two-Year Course in Botany to: Velma I. Cypher, F. Kenneth DeVoe, Robert E. Dodds, Anna W. Knight, Suzanne P. Roosevelt, Margaret M. Stover, and certificates for the Two-Year Course in Practical Gardening to: Joan Boeker, Mary W. Dodge, Jennie Drucker, Lee Erde, Amy J. Goell, Walter Holbrook, Lila G. Horowitz, Elizabeth Lewkowitz, Eleanor R. Merrill, Paul Palazzo, Suzanne P. Roosevelt, Grace C. Scottino, Robert L. Scottino, Marion Walsh, and Elaine Dearborn Webster.

One hundred and fifty guests witnessed the graduation exercises and enjoyed the reception that followed on the terrace of the Snuff Mill. Dr. David D. Keck, Assistant Director and Head Curator, extended greetings on behalf of The Garden and J. H. Beale spoke on "Some Favorite Plants of Mine".

Grace M. Schilling Retires. "No one, as far as I am aware, has served a longer period of time at The New York Botanical Garden. You may well feel proud that all four of the directors of the Garden have looked to you for assistance and encouragement". With these words Dr. William Robbins, Director, acceded to the request of Mrs. Grace M. Schilling to retire September 1, 1957, adding "you know the affection and regard in which I, and all the others here, hold you".

Mrs. Schilling, then Grace M. Willey, came to the Garden on January 2, 1901. Dr. Nathaniel Lord Britton, then Director, was away when Mrs. Britton interviewed her and put her to work (subject to Dr. Britton's approval on his return) writing genus and species covers from "Catalog of North American Plants" by A. A. Heller. When Dr. Britton found her at a large herbarium table, he took one look at what she was doing and nodded approval. Thus was she formally engaged as a museum aide, and for the next seven years she assisted Mrs. Britton with mosses. She helped to separate, mount, and label the specimens and make duplicate sets, working in what is now known as the "Members' Room". What is now the cloak room was the moss room — duplicates were filed in pigeon-holes beneath the large table that occupied the center of the room. Another task assigned to Mrs. Schilling at that time was the cutting out of all the illustrations from Britton and Brown's Illustrated Flora and writing the name of the plants on the reverse of each illustration!

On November 1, 1908, she became Dr. Britton's stenographer and continued as such till she left on September 1, 1910, to be married to Alexander C. Schilling. Two children were born, Ralph Alexander and Grace Marjorie, now Mrs. Philip Gandert. After her husband's death, Mrs. Schilling returned to the Garden as custodian of lantern slides. Two years later, in 1921, and until 1929, she was secretary to Dr. Britton, taking dictation in the morning and working on the manuscript of his "Scientific Survey of Puerto Rico and the Virgin Islands" in the afternoon.

When Dr. Marshall Howe was named Acting Director, following Dr. Britton's death in August 1929, Mrs. Schilling became his secretary. Then in 1930, she became secretary to the new Director, Dr. E. D. Merrill, continuing to serve him during his term of office. In October 1935, she found herself with Dr. Howe again as her "boss," when he was appointed Director, and she remained his secretary until his death on Christmas Eve 1936. Dr. H. A. Gleason was then appointed Acting Director, and she performed secretarial duties for him until Dr. William J. Robbins assumed the responsibilities of Director in February 1938. She served Dr. Robbins as secretary until February 1947, when she became the secretary to Henry de la Montagne, Assistant Director and Secretary of the Corporation. Mrs. Schilling has also taken care of the notices and minutes of the meetings of the Advisory Council, as well as certain of its records, since December 7, 1932.

Mrs. Schilling did not confine her usefulness to the director of the Garden. She helped other staff members in those early days whenever she could, working overtime at the home of Dr. John K. Small, typing descriptions and correcting two small errors in "The Flora of Southeastern United States", typing manuscripts for Dr. J. A. Shafer and Dr. H. H. Rusby, taking occasional dictation from Dr. W. A. Murrell, and assisting Prof. L. M. Underwood with his ferns and now and then performing some task for Dr. P. A. Rydberg.

What changes Mrs. Schilling has witnessed in the fifty-six years since she came to The New York Botanical Garden: "To the rear of the Director's office was a quarry—the men blasted and hammered for years to level the land before they were able to sow grass seed and set out plants." "The slope on the way to what is now the Thompson Memorial Rock Garden was then covered with columbines. Mrs. Britton loved wild flowers; there were many different kinds in those days. She was secretary-treasurer of the Wild Flower Society of America, and I helped her to send out dues notices". "The tulip-trees lining the walks to the Museum Building were planted after I came here". "Dr. Howe's great hobby was dahlias; he had a fine planting of them between the Museum Building and the New York Central Railroad Station, that land then being part of the Garden". "In those days there weren't as many roads, and they were much narrower; we had horses and wagons, and we walked more than we do now".

As she thinks back over the years, she has a twinkle in her eye and a gentle smile on her lips. Mrs. Schilling knows a lot about The New York Botanical Garden. Her gracious presence will be missed.

Edwin De T. Bechtel, member of the Board of Managers of The New York Botanical Garden since September 30, 1943, died at his home in Bedford Four Corners, Mount Kisco, New York, on July 5, 1957, at the age of seventy-seven. Mr. Bechtel, who was a Fellow for Life of the Garden, had been elected a member of the Corporation on January 4, 1944, and was also appointed a member of the executive committee of the Board of Managers on that date—a membership he held up to the time of his death.

Mr. Bechtel had been senior partner of the New York law firm of Carter, Ledyard, and Milburn; after his retirement ten years ago, he maintained his own law office at 63 Wall Street. Mr. Bechtel recently endowed the Alfred North Whitehead lectureship in law at Harvard University; he had earlier established the Bechtel prize in philosophy.

He was author and authority on roses and had made extensive trips to Europe with Mrs. Bechtel to study techniques and observe results of hybridization. The pages of The Garden Journal of The New York Botanical Garden have been enriched by his contributions.

Mr. Bechtel was also interested in prints and etchings, and in 1955 had written a

Mrs. Grace M. Schilling, who has faithfully served the Garden many years, retired September 1, 1957

biographical monograph on Jacques Callot which included 237 reproductions of the artist's work. He had lately opened a Callot exhibit at Princeton University.

Mr. Bechtel had been active in the affairs of the Horticultural Society of New York and of the American Rose Society, and held the Rose Medal of the Garden Club of America.

Tree Planting Project. Home owners in the Menlo Park district of Portland, Oregon, the Portland Electric Company, and the Oregon Association of Nurserymen cooperated in a tree planting project. Two hundred and twenty-five shade trees were planted in parking strips at the rate of one to every fifty feet of house frontage; two trees to a lot were planted in certain streets selected for informal treatment; and six to eight trees were planted where landscape architects decided such accent was desirable.

Portland General Electric Company, whose horticulturist, Frank Mackaness, is a former student-gardener of The New York Botanical Garden, recently published an attractive booklet, "The Trees on your Street", prepared by Desmond Muirhead, and illustrated in color, for distribution among civic and professional groups interested in shade tree planting in Oregon.

New Fruit Varieties: The U.S.D.A. recently announced that eleven new varieties of virus-free strawberries are now available to gardeners and commercial growers. 'Earlidawn', 'Eden', 'Empire', 'Florida', 'Ninety', 'Gem', 'Konvoy', 'Marion Bell', 'Redglow', 'Sioux', and 'Surecrop' bring the number of virus-free varieties, developed by U.S.D.A. scientists in cooperation with several state experiment stations, to thirty-five.

Cornell University recently announced the introduction of the apple "Barry', resulting from a cross in 1923 between 'McIntosh' and 'Cox Orange'. The seedling, first propagated in 1937 has produced fruit every year since 1947. The new variety bears the name 'Barry' in honor of Patrick and William Barry of the old and famous Elwanger & Barry Nursery of Rochester, New York. Patrick Barry served on the first board of control of Cornell's experiment station in 1882.

"Order of the Green Thumb". On a recent lecture engagement at Wadesboro, North Carolina, Dr. P. P. Pirone, Plant Pathologist of The New York Botanical Garden, met Susan M. (Mrs. Herman H.) Hardison of that community and had the pleasure of visiting her very beautiful garden. He was so impressed with her garden and her intense interest in gardening and her great contribution in making the whole town "garden conscious", that Dr. Pirone nominated her to the "Order of the Green Thumb". On June 30, 1957, this was mentioned by Sam Caldwell on his "Garden Gate program" on CBS radio.

Mrs. Hardison has inspired all the citizens of Wadesboro, both well-to-do and poor, to take an active interest in beautifying the town. On the day of Dr. Pirone's visit, a hundred dogwood were being planted to enhance its appearance.

Last year Mrs. Hardison was awarded the "Quelques Fleurs" citation for North Carolina for a forty-square foot flower bed in the Renaissance Spirit.

BOOKS FOR THE YOUNGER GENERATION

By Muriel Ortmeyer

AMERICA'S NATURAL WONDERS. C. B. Colby. 48 pages, illustrated. Coward-McCann, New York. 1956. $2

Here is a brief but entrancing introduction to each of fifteen natural wonders in different parts of our country. Each large black and white photo is accompanied by a short but succinct explanation of how the wonder was formed. For example, the young reader will learn that the White Sands desert is really thousands of acres of *Gypsum*; the Rainbow Bridge and Texas Lighthouse were formed by erosion; and the Everglades Swamp in Florida is caused by land recently risen from the floor of the Atlantic Ocean.

The wonders selected by the author for inclusion in this small book are not necessarily just the well-advertised marvels like the Carlsbad Caverns,; but are, in part, less famous yet equally interesting ones such as Pennsylvania's Ringing Rocks. The author's intention is to pique the curiosity and to encourage the reader to see as many as he can of the marvels that Nature has given to this great country of ours.

Although this book would serve as an interesting adjunct to any lesson in American geography, it hardly seems fair to give such a travel-inspiring book to children who will not have a chance to visit at least some of these wonders in the near future.

THE FIRST BOOK OF FOOD. Ida Scheib. 65 pages, illustrated by the author; indexed. Franklin Watts, Inc., New York. 1956. $1.95

The author has written and illustrated a book that takes children on a fascinating, first trip to different parts of the world to look at a wonderful assortment of food-producing and processing methods.

Children will be eager to see the different animals that give milk to people around the world, from the water buffalo in India (where cows are sacred), to goats in Europe (where there is not enough pasture for many cows), to camels in Arabia (where it is too hot for cows), and reindeer in Lapland and yaks in Tibet (where it is too cold).

Young readers are instructed how to make butter and cottage cheese at home and told how cheese is made commercially. They will learn how canning was discovered as a way of preserving food, as well as how to take advantage of this process by preparing a full-course dinner with a can opener.

Before the author is through describing all of the fascinating facts about food that she has discovered in her travels, it may be hard to keep your eight-to-twelve-year-olds from taking off for the nearest food factory or fish market or Chinese restaurant to taste something new.

A small index is included at the end of the book.

THE FIRST BOOK OF WEATHER. Rose Wyler. 63 pages, illustrated by Bernice Myers; indexed. Franklin Watts, Inc., New York. 1956. $1.95

For a first book on the subject, this is a very complete and scientifically accurate account of many weather phenomena and their causes. Yet it is conversationally written and, with the aid of clever diagrams, very easy to understand. It appears to answer almost every question an eight-year-old mind could ask from "What is air?" to "How can the weather be forecast?" and "What do rain-makers do?"

It might prove equally useful as a quick refresher course for rusty parents embarrassed by a curious four-year-old's questions. Not that four-year-olds can be expected to absorb all of this information even in a simple form, but the judicious parent can decide how much to give once he determines what the child is really asking. In this case the book will serve more as a morale booster for the parent than as a story book for the child. It will certainly not enlighten a pre-schooler to be told that the wind is made by the tendency of air to move from an area of high pressure to one of lower pressure. But it may relieve Daddy's mind to be able to say, instead of "I don't know," something like this: "Well, that is difficult to understand because we can't see the wind, just as we can't see the air, yet it is around us all the time. We are so used to it that we don't feel it until it moves, then we call the air wind."

If your youngster is the kind that has to be shown, this book provides easy experiments to show the weight of air, and suggests others that will help a child accept the fact that air is an entity which can move. An index is included for reference.

It is quite obvious that the author of this delightful book is a science teacher who knows her subject and knows children. Bernice Myers' clear red and blue illustrations are lively and amusing as well as instructive.

OUR AMERICAN TREES. Ruth H. Dudley. 147 pages, illustrated by Nils Hogner; indexed. Thomas Y. Crowell, New York. 1956. $2.50

This would be an excellent book for eight-to-twelve-year-olds who are beginning to camp, to study conservation and learn about trees, either in Scout troops or other Nature study classes. The language is on their level—simple, clear, and forthright.

The author's description of how the forests looked when the Pilgrims arrived, as well as the way in which the pioneers used the forests in different parts of the country, will add to the American history these children have been studying in school. While condemning the wanton use of forests by the pioneers, the author nevertheless understands why they were so used. From this she draws a good lesson on the difference between being free to do as one pleases and the responsibility to use free resources for the good of all now and in the future. It is a lesson which children should find palatable, for there is no moralizing about it, but simply a logic deduced from facts which children can readily accept. They will certainly be convinced by the descriptions of the great fires and floods which led to the establishment of the Forest Service. This book should lead both children and adults to a greater appreciation of our fine parks system and the need for it, aside from recreational use.

The clear line drawings of Nils Hogner are attractive in black and white. They help to explain the anatomy of trees and the way they grow which the author develops into two chapters.

In the last seven chapters she gives a great deal of fascinating information about the many kinds of trees and their uses: "Trees that give us fuel," "Trees that give us cloth," etc. A useful index is included.

ALL ABOUT THE FLOWERING WORLD. Ferdinand C. Lane. 141 pages, illustrated by Russell Francis Peterson; indexed. Random House, New York. 1956. $1.95

Although this is a longer text, like OUR AMERICAN TREES, it is still simple and straightforward in style without being chatty. It should make a good second book for young botanists.

In some detail the author describes the anatomy of a flower, the story of pollination, the ways in which seeds are scattered, covered, and protected, how leaves and roots do their work, how plants protect themselves in the struggle for survival, interesting things that plants give to us like the sap of the sapodillo tree, called "chicle" and used for—can you guess?

In the last chapter are told some of the strange facts and seemingly miraculous phenomena of the plant world. Children may be amazed to learn that once apples grew only in Russia, north of the Caspian Sea and that they have spread around the world sometimes by the efforts of one or two people, like Johnny Appleseed who is more than a legend in this country. It is also interesting to learn that pineapples, once native to Brazil, are now grown chiefly in Hawaii; and that Brazil which also first grew rubber trees now has relinquished the role of chief producer to Malaya.

Pre-adolescents usually find most of Nature fascinating, but they will be especially captivated by plants that eat insects, plants that reindeer eat under the snow, plants the dinosaurs ate, and so on.

Mr. Peterson's illustrations are simplified diagrams or cross sections of plants, with some line drawings of plants in their native habitat. An index is included.

INSECTS AND THEIR WORLD. Carroll Lane Fenton and Dorothy Constance Pallas. 95 pages, illustrated by Carroll Lane Fenton. The John Day Co., New York. 1956. $2.95

This book will take your young entomologist on a tour of the insect world. When he has read the stories of "Digger," the hunting wasp, "Anax," the dragon-fly, "Tib," the cicada, and "Corax," the water boatman, he (or she) will really feel as if he had really met some of the fascinating creatures that live such well-organized lives around us.

Not all of the book is written in this personalized story form. The latter part of each chapter gives a straightforward presentation of facts after the story has aroused interest and sympathy. Such chapters as "How insects move," "Living in winter," "Insects that live together," and "Useful insects" give a great deal of information about the variety of the forms of life in the insect world.

Carroll Fenton's exquisitely detailed line drawings are wonderful pictures of the anatomy and habits of this tiny world.

This book would be useful to pre-adolescents beginning to collect and study insects. It is not sufficiently complete and is not indexed for use as a reference.

YOU AND THE SCIENCES OF PLANTS, ANIMALS AND THE EARTH. Ray Broekel. 60 pages, illustrated by Stephen Gal. Children's Press, Chicago, Ill. 1956. $2

If your twelve-year-old son or nephew is announcing that he will be an ichthyologist when he grows up, whether his interest stems from the fine tongue twister or from his love of tropical fish, this book is for him. You may not be able to live with his phases of being an oceanographer, petrographer, palaeontologist, mycologist, herpetologist, or malacologist, but he is sure to love this book as a source of supply for such adult-stopping words.

However, any young scientist will be equally attracted by the author's real purpose, which is to give a brief introduction to the whole field of science—showing how each is studied and how it is related to the other sciences. The chart showing these relationships is useful. The author also explains the meanings of the fancy names for the sciences in terms of the Latin and Greek roots. Stephen Gal's illustrations in black and white are amusing as well as useful for pegging a science in a child's memory.

This book should help the budding scientist to organize and classify his miscellaneous information about the world into convenient as well as fancy pigeon-holes. It would not be advisable to give such a book to any child who is not already curious about scientific areas and has done considerable reading about several of them. It is not a book to stimulate interest but rather one to help organize and systematize a diverse field, which many curious minds often meet in a haphazard way.

WONDER WORLD OF MICROBES. Madeleine P. Grant. 160 pages, illustrated by Clifford N. Geary; indexed. Whittlesey House, McGraw-Hill Book Co., New York. 1956. $2.75

Here is a book for a young scientist who is well on his way to discovering, in addition to the world he can see around him, that formerly unseen world of the microscope. For most children this book would be too long and too detailed, until they are well into Junior High School.

The author begins each chapter with human interest stories—of children cured of yaws through the U.N. health programs, of Leeuwenhoek's development of the microscope, etc. Although the style tends to be a little stilted, the information is intrinsically interesting.

Mr. Geary's black and white sketches clearly illustrate charts such as the life cycle, types of microbes, and famous scientists like Pasteur. A useful index is included to assist the reader in using the book for school reference.

A timely ending is found in the story of Man's most recent achievement in the field of microbes—that of Dr. Salk and his polio vaccine.

BOOK REVIEWS (from page 172)

This is, no doubt, the most complete book on the subject and will be welcomed by all who wish to enter this field whether it be for pleasure or for profit.

STEPHEN G. CUTTING, *Horticulturist*
Yale University Forestry
Research Laboratory
Valhalla, N. Y.

HYDROPONICS. THE BENGAL SYSTEM. Sholto Douglas. 145 pages, illustrated, indexed. Oxford University Press, New York. 2nd edition 1955. (Printed in India.) $1.85

HYDROPONICS. THE BENGAL SYSTEM, by Sholto Douglas was first published in 1951. The second edition, published to meet the demand for this book, includes some changes in the text to cover the developments of the past five years. Mr. Sholto Douglas wrote an article on this subject in the July-August 1955 issue of THE GARDEN JOURNAL.

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ENCYCLOPEDIA OF ROSES AND ROSE CULTURE. Edited by H. Champneys, revised by Carl L. Withner. 226 pages, illustrated in color and black and white. Prentice-Hall, Inc., Englewood Cliffs, N. J. 1957. $7.50

Giving all the pertinent information on anything pertaining to roses and rose culture in a brief and concise form, this should be a valuable book for all amateur rose growers, whether they are beginners or have many years experience.

I find very little information in this book that has not been written at some time in the past; but having all of this information in one volume should be of value to any rose grower.

W. H. BOXMAN
Narberth, Pa.

THE ANATOMY OF NATURE. Andreas Feininger. 168 pages, illustrated with 176 photographs. Crown Publishers, New York. 1956. $5.95

An expert photographer, one who has long been interested in plants—and a staff photographer with Life Magazine for fourteen years—with experience in engineering and architecture, has selected his best photographs of nature subjects—the crushing grip of knotted roots—the spines of

cacti as a defence against leaf-eating animals, the winged seeds of maple for dispersal, a dead and fallen pinyon pine returning borrowed substances to the soil, the skeleton of a cholla cactus surpassing in mechanical efficiency any man-made structure, the wolf spider devouring a grasshopper — to illustrate how function shapes the form and design of animate and inanimate structures. The photographs are excellent and inspiring; some are intriguing in design.

Lovers of nature will appreciate this book, as will professional and amateur photographers. The latter will be interested in the techniques employed in nature photography as described by Mr. Feininger in the chapter "The Facts Behind the Pictures."

THE NEW AMERICAN GARDEN BOOK. Edited by Dorothy Sara. 809 pages, illustrated, indexed. Books, Inc., New York. 1954. $2.50

For this large book on gardening, the author lays no claim to originality except for the mechanics of its arrangement. Most of its subject-matter has been extracted from well-written bulletins of the United States Department of Agriculture and bulletins issued by the Department of Extension Teaching and Information of New York's Cornell University. Credit for a fractional part of the book's contents goes to the American Association of Nurserymen, The Haeger Potteries, Inc., and Monsanto Chemical Company.

The information from U.S.D.A. bulletins offer gardeners a broad scope, whereas that from Cornell bulletins provides information that is often of limited value. Many of the recommended procedures and plant lists would not be applicable over much of the United States.

Accepting these limiting factors, Miss Sara has done a commendable job in assembling her material in a pleasant and orderly sequence, and provides us with a wealth of valuable information which would never be tapped by any but ardent bulletin-accumulators. Having often been aware of the valuable material which is offered in bulletin form, horticulturally-minded readers should be very grateful for this work. Chapters cover I Landscaping for Beauty and Comfort, II Good Soil for Planting, III The Home Lawn, IV Additional Use and Beauty of Lawn, V Trees and Shrubs for the Home Grounds, VI Propagation of Trees and Shrubs, VII Care of Damaged and Diseased Trees, VIII The Outdoor Flower Garden, IX The Rose Garden, X The Rock Garden, XI Savory Herbs: Culture and Use, XII House Plants, XIII Flower Arrangements, XIV Hotbeds, Coldframes, Greenhouses, XV Vegetable Gardening, XVI Gourds, Useful and Ornamental, XVII Growing Fruit for Home Use, XVIII Insect Enemies and Diseases of Plants, XIX Poison-Ivy, Poison Oak, Poison Sumac and XX Garden Tools and Equipment.

The information is all based on very well-established fact and practical application of knowledge accumulated in years of experimental work carried out by experiment stations. I venture to say that anyone can obtain a wealth of knowledge from this encyclopedic volume, and I hope that it enjoys the popularity it deserves. Authors of the many bulletins from which the subject-matter has been assembled should be grateful for the new audience this book may reach.

HOWARD W. SWIFT

LIGHT, VEGETATION AND CHLOROPHYLL. J. Terrien, G. Truffaut, and J. Carles. 228 pages, indexed. Translated by Madge E. Thompson. Philosophical Library, New York. 1957. (Printed in Great Britain.) $6

This small volume contains translations from the French of *Lumiere et Vegetation* by Jean Terrien and George Truffaut, and *L'Energie Chlorophyllienne* by Jules Carles. Both were translated by M. E. Thompson.

The first of these long essays, aside from an excellent section on the physics of light, is hopelessly out of date and, in fact, is quite misleading. Theories on photosynthesis, phototropism, and photoperiodism presented in this paper were discarded twenty or more years ago.

The section by Dr. Carles is considerably better with adequate discussions of energy exchange in respiration and photosynthesis, and the efficiency of photosynthesis. It, too, suffers from numerous errors and reminds the reviewer of many term papers by graduate students, including those of the reviewer.

RICHARD M. KLEIN
Caspary Curator of Plant Physiology

Garden Club of New Jersey Flower Show School, Course II, October 16, 17, 18, 1957, at 369 Park Avenue, Orange, N. J.

Federated Garden Clubs of New York State, Inc., School of Landscape Design, Course I, (repeat), October 23, 24, 1957, at French Institute, 22 East 60th St., New York, N. Y.

Fourteenth Annual Show of the National Chrysanthemum Society, October 25, 26, 27, 1957, in the U.S. Botanical Garden, Washington, D. C. The Potomac Chrysanthemum Society is the show sponsor. For information and schedules write Mrs. William E. Doyle, 1623 Gruenther Avenue, Rockville, Md. Meetings will be held in the Mayflower Hotel and will feature talks on topics of interest to chrysanthemum growers. For information about the meetings and membership in the National Chrysanthemum Society write Miss Dorothy P. Tuthill, Secretary, 345 Milton Road, Rye, N. Y.

Mounting Seaweeds. "I noted with interest the announcement of the exhibit of seaweeds. Ever since I can remember I have been mounting seaweeds—in a small way. I gather the seaweeds in summer and roll them in fine dry sand; then in winter, when I have more leisure, I mount them. They keep well this way if one uses plenty of sand—the very fine sand found at the top of a beach is best.

"Mounting seaweeds involves safe tools —water, shallow pan, paper, and cloth to cover the specimen as it is put into a press of newspapers.

"I have suggested the mounting of seaweeds for occupational therapy, especially for the mentally ill. Another suggestion for such work is the pressing of gaily colored leaves, then pasting them in patterns on large sheets—leaves, paste and paper are all that is needed. Evergreen leaves, such as ivy and euonymus can also be used — pressed, then mounted in the outline of a wreath or a Christmas tree and trimmed with colored paper cut-outs."

FRANCES R. WILLIAMS
Winchester, Mass.

LET THERE BE HERBS

"I had rather live
With cheese and garlic in a windmill."
Shakespeare, Henry the Fourth

Hotspur would not have lacked for companions if the garlic flavoring his bread had been garlic chives, *Allium tuberosum*. With this herb it is possible to add to any dish "a little garlic." The flat leaves are as tender as the round-leaved chives when snipped into salad or cream cheese dip, but they have a rich pungency of garlic.

Even more wonderful than the garlic flavor of the leaves of *Allium tuberosum* are the white star-shaped flower clusters which have the sweet scent of tuberoses. Best of all they bloom in September when many of the white flowers in the garden are finished. English writers call this eighteen-inch tall hardy perennial plant "Chinese chives" and describe the perfume of the blossoms as being like that of the hawthorn.

Being not as addicted to members of the onion tribe for cooking as are the French, the English look on *Allium tuberosum* as more important to the perennial border than to the kitchen garden. It makes a more graceful clump of green foliage than chives with clusters of small, hard bulbs that become quite thick over the years. If allowed to go to seed, garlic chives will self-sow freely.

Young plants volunteered from last season's seed make excellent subjects for potting to take indoors. They will grow in a window box or clay pot without drooping, as do chives that have not been frozen for a month or two before forcing in the house. Alliums are heavy feeders, so rich potting soil and a regular schedule of feeding with liquid plant food are necessary.

Rocambole

Another means of employing a little garlic is to use the tiny bulbils which form on the top of rocambole, French garlic or serpent garlic, *Allium Scorodoprasum*. These individually encased small segments, of good garlic flavor, form a ball atop the two-foot perennial plants instead of flowers. They can be stored by hanging upside down in a brown paper bag for winter and each individual clovelet used as needed. There is real economy in this plant, for it is possible to use a sliver of garlic without wasting a large lump of the ordinary clove garlic.

Besides having bulbils where blossoms are usually found, rocambole has another idiosyncracy. The flowering stems with pointed bud atop uncurl from a complete spiral as they elongate. When we first noticed this, we were reminded of birds standing on one leg with their long necks curved down in almost a complete circle.

It was aptly described centuries ago by Jason Hill who said: "Its beak-shaped flower-heads writhe upwards in elaborate curves and coils, imitating a flamingo at its toilet, and sometimes tying themselves in knots . . ."

When we sought seeds of rocambole for a subscriber in Kansas some years ago, none was sold in this country; however, he obtained bulbils from a firm in France. We offered seeds among our herb seeds when we had the only mail-order herb seed business in the country. Now we have given up the sale of seeds, but rocambole bulbils can be ordered from several herb plant and seed specialists.

Shallots

Shallots seem to us to combine the best of all the other onions in flavor with the nice fresh taste of apple. Added to that, the neat way in which the bulbs come in clusters like rather loose cloves of garlic makes this favorite of chefs very useful in the home kitchen.

In the fall it is possible to find quart baskets of shallots, *Allium ascalonicum,* at a real green grocer's. The bulbs look quite a bit like crocus bulbs. They have a brown skin and the individual segments of the clusters are the size of spring crocus bulbs. If you don't find them in market, be sure to ask for them.

Shallots should be planted in October, in the same manner as tulip bulbs, but not so deeply. In the spring the shoots will look like any small onion, dying down in July. When the tops are well withered the bulbs may be dug. Then a section of each cluster can be left to make the plants give another crop next year. If allowed to remain in the ground as a perennial, shallots will live until after flowering. Unless seed is desired, it is best to lift the bulbs each summer and replant in well-fertilized fresh soil. They must be stored dry, or they will rot during the winter .

French recipes call for shallots much more frequently than do American ones. It seems odd that the delightful cluster onion is not better known in this country. In Louisiana, where the Creole cookery uses a quantity, shallots are grown on a large scale for market. Shallots may be substituted for onions in any recipe, but here are a few calling for them specifically.

Shallot Vinegar

Peel and slice thinly two ounces shallots and steep in one pint vinegar. Shake daily for two weeks and strain. Cork securely.

Petit Pois au Jus

2 tbsp butter	2 sprigs thyme
2 pkg. frozen peas	3 or 4 sprigs parsley
8 to 10 shallots	1 tsp. sugar
1 head garden lettuce	Salt and pepper

Melt butter in saucepan, add peas and onions. Then wash and pluck lettuce apart and distribute around, under, and over the peas. Lay thyme and parsley on top of peas under the lettuce leaves. Cover tightly and allow to simmer on low flame without water — since lettuce leaves will moisten them sufficiently. Stir from time to time and add a spoonful of water if peas become too dry. They should be nearly done in 45 minutes. Then add the sugar, salt and pepper, heat thoroughly, and serve with additional butter if desired.

P. V. Metzelthin in World Wide Cook Book

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